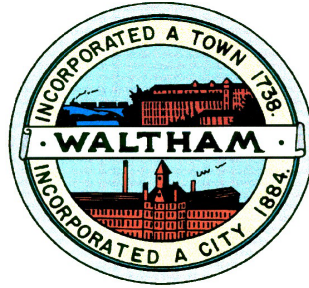


The City of Waltham



**Invites
Interested Parties
To propose the best offer and or bid
For the service or product herewith described:**

CEDARWOOD WATER STORAGE TANK REHABILITATION PROJECT

The virtual bid opening will be held: 10:00AM February 8th, 2024

A virtual pre-bid conference will be held: 10:00AM January 26th, 2024

Last day for written questions: 12:00PM February 2nd, 2024

(via email ONLY to cphilpott@city.waltham.ma.us)

**TOWN OF WALTHAM, MASSACHUSETTS
CEDARWOOD WATER STORAGE TANK
REHABILITATION PROJECT**

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**TOWN OF WALTHAM, MASSACHUSETTS
CEDARWOOD WATER STORAGE TANK
REHABILITATION PROJECT**

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**TOWN OF WALTHAM, MASSACHUSETTS
CEDARWOOD WATER STORAGE TANK
REHABILITATION PROJECT**

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DIVISION 0 – BIDDING AND CONTRACT REQUIREMENTS

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SECTION 00010

INVITATION TO BID

**Cedarwood Water Storage Tank
Rehabilitation Project**

Location of Work: City of Waltham, Massachusetts. Sealed Bids for the construction of the Cedarwood Tank Rehabilitation Project will be received by Crystal Philpott, CPO, Purchasing Department, 610 Main Street Waltham, Massachusetts until 10:00 a.m., February 8, 2024, at which time and place all bids will be opened and read aloud via Zoom Please see the City's website for meeting details.. Bids submitted after this time will not be accepted. The project involves the following major items for the 2.0-million-gallon steel standpipe tank located in Cedarwood:

- Apply new interior and exterior coating systems
- Furnish and install tank mixing system
- Furnish and install new OSHA-compliant ladder
- Seal foundation and interior roof seams
- Modify overflow pipe discharge
- Furnish and install new valve vault hatch
- Furnish and install extended roof walkway and safety handrail system
- Furnish and install tank sample tap and insulated enclosure
- Furnish and install pressure transmitter in valve vault
- Furnish and install tapping sleeve, valve and hydrant
- Temporary relocation of 911 and meter read antennas
- Site work including gravel drive improvements and fence repair

Contract Documents may be obtained by visiting the City's web site at <https://www.city.waltham.ma.us/category/tags/purchasing-bids-open-0> after January 17, 2024.

A virtual pre-bid meeting is scheduled for Friday, January 26, 2024 at 10:00 a.m. Please see the City's website for meeting details.

BID SECURITIES shall be in amount of 5% of the bid and in the form of a certified check drawn upon a bank within the State of Massachusetts or a bid bond executed by a surety company authorized to do business in Massachusetts, made payable to the OWNER.

The successful bidder must furnish a 100% PERFORMANCE and PAYMENT BOND and will be required to execute the Contract Agreement within five (5) days following notification of the acceptance of the Bid. The OWNER reserves the right to reject any or all bids, to accept any bid, to waive any informality on bids received, and to omit any item or items deemed advisable for the best interests of the OWNER. The award of the contract may be contingent upon the appropriation of funds from City Council Meeting. All costs associated with the preparation of the bids shall be the responsibility of the bidder, regardless of whether or not the Contract is awarded.

END OF SECTION 00010

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SECTION 00100

INSTRUCTION TO BIDDERS

PART 1 - GENERAL

1.01 SCHEDULE OF DATES

- A. Advertisement appears in Central Register, Plans and Specifications ready for Bidders at www.city.waltham.ma.us/bids.
- B. **Pre-bid meeting: 10:00 A.M. Friday January 26, 2024** via Zoom. Please see the City of Waltham's website for meeting details.
- C. **Questions** and requests for interpretations may be submitted in writing via e-mail ONLY to cphilpott@city.waltham.ma.us up to **12:00 P.M. February 2, 2024**
- D. Addenda will be issued with interpretations as determined by the Purchasing Department only via e-mail and posting on the web site.
- E. **General Bids Deadline: 10:00 A.M. Thursday, February 8, 2024** in the Purchasing Department, City Hall, 610 Main Street, Waltham, MA 02452, Attn: C. Philpott, CPO, where the bids will be publicly open and read via Zoom.

1.02 BIDDING PROCEDURE

- A. Bids for the work are subject to the provisions of Massachusetts General Laws, Chapter 30, 39M, as amended. Regulations governing the bidding procedures as set forth in the above-mentioned amended General Laws must be followed.
- B. In the event of any inconsistencies between any of the provisions of these Contract Documents and of the cited statute, anything herein to the contrary notwithstanding, the provisions of the said statute shall control.
- C. No General Bid received by the Awarding Authority after the time respectively established herein for the opening of General Bids will be considered, regardless of the cause for the delay in the receipt of any such bid.

1.03 WITHDRAWAL OF BIDS

- A. Bids may be withdrawn prior to the time respectively established for the opening of General Bids only on written request to the Awarding Authority.

1.04 INTERPRETATION OF CONTRACT DOCUMENTS

- A. No oral interpretation will be made to any bidder. All questions or requests for interpretations must be made in writing ONLY to cphilpott@city.waltham.ma.us.
- B. Every interpretation made to a bidder will be in the form of an Addendum to the drawings and/or specifications, which will be made available to all persons to whom Contract Documents have been issued.
- C. Failure of the Awarding Authority to send or of any bidder to receive any such Addendum shall not relieve any bidder from obligation under his bid as submitted.
- D. All such Addenda shall become a part of the Contract Documents.

1.05 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

- A. Each bidder may visit the site of the proposed work and fully acquaint himself with conditions as they exist and may also thoroughly examine the Contract Documents. Failure of any bidder to visit the site and acquaint himself with the Contract Documents shall not relieve any bidder from any obligation with respect to his bid.
- B. By submitting a bid, the bidder agrees that the Contract Documents are adequate and that the required result for a full and complete installation can be produced. The successful bidder shall furnish any and all labor, materials, insurance, permits and all other items needed to produce the required result to the satisfaction of the Awarding Authority.

1.06 BID SECURITY

- A. The General Contractor's bid must be accompanied by bid security in the amount of five percent (5%) of the bid.
- B. At the option of the bidder, the security may be bid bond, certified, treasurer's or cashier's check issued by a responsible bank or trust company. No other type of bid security is acceptable.
- C. Bid Bonds shall be issued by a Surety Company qualified to do business under the laws of the Commonwealth of Massachusetts.
- D. Certified, Treasurer's or Cashier's check shall be made payable to the City of Waltham, Massachusetts.
- E. The bid security shall secure the execution of the Contract and the furnishing of a Performance and Payment Bond by the successful General Bidder for 100% of the contract value.

- F. Should any General Bidder to whom an award is made fail to enter into a contract therefore within five (5) days, Saturdays, Sundays and Legal Holidays, excluded, after notice of award has been mailed to him or fail within such time to furnish a Performance Bond and also a Labor and Materials or Payment Bond as required, the amount so received from such General Bidder through his Bid Bond, Certified, Treasurer's or Cashier's check as bid deposit shall become the property of the City of Waltham, Massachusetts as liquidated damages; provided that the amount of the bid deposit, which becomes the property of the City of Waltham, Massachusetts, shall not in any event exceed the difference between his bid price and the bid price of the next lowest responsible and eligible bidder; and provided further that, in case of death, disability, bona fide clerical error or mechanical error of a substantial nature, or other unforeseen circumstances affecting the General Bidder, his deposit shall be returned to him.

1.07 BID FORM

- A. General Bids shall be submitted on the "FORM FOR GENERAL BID" enclosed. Erasures or other changes must be explained or noted over the signature of the bidder.
- B. Bid forms must be completely filled in. Bids which are incomplete, conditional, or obscure, or which contain additions not called for will be rejected.
- C. General Bidders shall submit one set of executed bid forms to the Awarding Authority.

1.08 SUBMISSION OF BIDS AND BID SECURITIES

- A. Each bid submitted by a General Contractor shall be enclosed in a sealed envelope that shall be placed with the bid security in an outer envelope. The outer envelope shall be sealed and clearly marked as follows:

(Firm Name): _____
Cedarwood Water Storage Tank Rehabilitation Project

1.09 AWARD OF CONTRACT

- A. The Contract shall be awarded to the lowest responsible and eligible General Bidder on the basis of competitive bids in accordance with the procedure set forth in the provision of Chapter 30, §39M of the General Laws of the Commonwealth of Massachusetts.
- B. If the bidder selected as the General Contractor fails to perform his agreement to execute a contract in accordance with the terms of his General Bid and furnish a Performance Bond and a Labor and Materials or Payment Bond, as stated in his General Bid an award shall be made to the next lowest responsible and eligible bidder.
- C. The words “lowest responsible and eligible bidder” shall be the bidder whose name is the lowest of those bidders possessing the skill, ability, and integrity necessary for the faithful performance of the work and who shall certify that he is able to furnish labor that can work in harmony with all other elements of labor employed, or to be employed, on the work. Essential information in regard to such qualifications shall be submitted in such form as the Awarding Authority may require.
- D. Action on the award will be taken within sixty (60) days, Saturdays, Sundays, and Legal Holidays excluded after the opening of the bids.

1.10 SECURITY FOR FAITHFUL PERFORMANCE

- A. The successful bidder must deliver to the Awarding Authority simultaneously with his delivery of the executed contract, an executed Performance Bond, and also a Labor and materials or Payment Bond, each issued by a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority and each in the sum of One Hundred Percent (100%) of the Contract Price, as surety for the faithful performance of his contract, and for the payment of all persons performing labor or furnishing materials in connection therewith. Said bonds shall provide that, if the General Contractor fails or refuses to complete the Contract, the Surety Company will be obligated to do so.
- B. Premiums are to be paid by the General Contractor and are to be included in the Contract Price.

1.11 EQUAL OPPORTUNITY

- A. The City of Waltham is an Equal Opportunity employer and will require compliance with the minority business enterprise plan (MBE) on file in the Purchasing Department

1.12 PRE-BID WALK-THRU

- A. A pre-bid conference will be held **10:00 AM January 26, 2024**, via Zoom. All Meeting coordinates will be sent following the distribution of the bid documents. Interested parties are encouraged to attend this meeting to become more familiar with the project prior to the submission of bids. See the City of Waltham's website for meeting details.

1.13 SITE VISITS

Prospective bidders are encouraged to visit the site at their own schedule prior to the Bid Opening.

1.14 CONTRACT DOCUMENTS

- A. The Awarding Authority shall make available the bid documents and addenda in the City Web site at www.city.waltham.ma.us/bids. No plans will be mailed.

1.15 EQUALITY

- A. Except where otherwise specifically provided to the contrary, the words “or approved equal” are hereby inserted immediately following the name or description of each article, assembly, system, or any component part thereof in the Contract Documents. It is the Contractor’s responsibility to provide all the research and documentation that would prove a product or assembly is “equal”. Failure to provide research or documentation does not alleviate the Contractor’s responsibility to meet the schedule.

1.16 TAX FREE NUMBER

- A. The City of Waltham has a tax-free number.

1.17 SCHEDULE

- A. The work of the Contract shall be Complete in **180 calendar days** after the date of the Notice-to-Proceed.

1.18 INTENTIONALLY LEFT BLANK

1.19 WEEKLY JOB MEETINGS

- A. There will be a weekly job meeting at the site on the same agreed-upon day and time. Time will be provided to discuss and view the progress of the work and to answer questions. The Contractor's job Superintendent and Project Manager shall attend each meeting. The City reserves the right to have job meetings conducted in the location of its choosing.

1.20 PROJECT SUPERINTENDENT

- A. The Contractor shall provide the same person as Superintendent for the entire duration of the project. Failure to maintain the same person in this position shall result in a One Thousand Dollar (\$1,000.00) penalty per incident which shall cover the Architect's time to re-orient new personnel.

1.21 AWARD

- A. The Awarding Authority reserves the right to reject any or all bids if it be in the public interest to do so, and to act upon the bids and make its award in any lawful manner. An award shall be made no less than 90 days from the Bid Opening Date.

1.22 PREVAILING WAGE SCHEDULE

- A. Bids shall be made on the basis of the Prevailing Wage Schedule, as determined by the Commissioner of Labor and Industries, pursuant to the provision of the Massachusetts General Laws. The Prevailing wage Schedule for this project can be found in the City's web Site at www.city.waltham.ma.us/bids.

1.23 CONFLICT OF INTEREST

- A. A bidder filing a proposal thereby certifies that the proposal is made in good faith, without fraud, collusion, or connection of any kind with any other bidder for the same work, and that the bidder is competing solely on its own behalf without connection with, or obligation to, any undisclosed person or firm.

1.24 PROCEED ORDERS

- A. No bidder is to proceed without a proceed order as set out in the contract.

1.25 INTENTIONALLY LEFT BLANK

1.26 COMPLIANCE WITH MASSACHUSETTS GENERAL LAWS

- A. Pursuant to Massachusetts General Laws, Chapter 62C, Section 49A, I certify under the penalty of perjury that I, to the best of my knowledge and belief have filed all state tax returns and paid all the state taxes required under law.

1.27 CONSTRUCTION BARRICADES

- A. The General Contractor shall provide all barricades to enclose the work area to prevent unauthorized access to the site.
 - 1. The barricades shall provide enough room for all construction activities to be performed while separated from pedestrians, students, and staff on site.
 - 2. Safety is the sole responsibility of the Contractor and any barricades necessary to protect the work and the public shall be provided.
 - 3. Provide entrance protection.

1.28 INSURANCE

- A. The contractor shall purchase and maintain, at his expense all insurance required by the Contract. Documents and all insurance required by the applicable laws of Massachusetts, including but not limited to, General Laws, Chapter 146, in connection with all hoisting equipment.
- B. The Contractor shall purchase and maintain such insurance as will protect him from claims under workmen's compensation acts and from claims for damages because of bodily injury, including death and all property damage including, without limitation, damage to buildings and adjoining the site of construction which might arise from and during operations under this contract, whether such operations be by himself or by any subcontractor or anyone directly or indirectly employed by either of them including:
 - 1. Statutory Worker's Compensation and Employer's Liability

The contractor shall provide insurance for the payment of compensation and the furnishing of other benefits under Chapter 152 of the General Laws (so-called Worker's Compensation Act) to all persons to be employed under this contract and shall continue in force such insurance as aforesaid shall be deemed a material breach of this Contract and shall operate as an immediate termination thereof. The contractor shall, without limiting the generality of the foregoing, conform to the provisions of Section 34A of Chapter 149 of the General Laws, which Section is incorporated herein by reference and made a part of hereof.
 - 2. Comprehensive General Liability Insurance

Minimum bodily injury limits of \$1,000,000 per person and \$1,000,000 per accident, and property damage limits of \$ 500,000 per accident and \$1,000,000 aggregate during any 12-month period, shall include the following:

- a. Public liability (bodily injury and property damage)
- b. X.C.U. (explosion, collapse, and underground utilities)
- c. Independent contractor's protective liability.
- d. Products and completed operations.
- e. Save harmless agreement for Owner and Architects set forth in ARTICLE 10.11 of the GENERAL CONDITIONS.

3. Comprehensive All Risk Motor Vehicle Liability Insurance

Minimum bodily injury limits of \$500,000 per person, \$1,000,000 per accident, and property damage limit of \$1,000,000 per accident.

4. All Risk Insurance

Covering all Contractors' equipment with a provision for Waiver of Subrogation against the Owner.

5. Excess Liability Insurance in Umbrella Form with combined Bodily Injury and Property Damage Limit of \$1,000,000.

6. **City of Waltham shall be a Named Additional Insured with a Waiver of Subrogation on the insurance policy for this project.**

1.29 SITE ACCESS

- A. The General Contractor shall gain access to the site via routes approved by the Owner.
 1. The General Contractor as part of the bid price will restore all roads, curbs, driveways, walks and grassed or landscaped areas damaged during construction.

1.30 CONSTRUCTION TRAILER

- A. The General Contractor shall locate the construction trailer at locations approved by the Owner.
- B. The General Contractor shall locate all on-site stored or staged materials within the enclosed area designated by the Owner.

1.31 INTENTIONALLY LEFT BLANK

1.32 COMPLETE BID FORMS

- A. Please Note: Each bidder must fill in all the blanks on all the bid forms, even if the information is “zero dollars” or “not applicable”. Also, please acknowledge all Addenda issued by the Awarding Authority.

2.00 FUNDS APPROPRIATION and LOAN AUTHORIZATION.

- A THE CONTRACT OBLIGATION ON BEHALF OF THE CITY IS SUBJECT TO PRIOR APPROPRIATION OF MONIES FROM THE GOVERNMENTAL BODY AND AUTHORIZATION BY THE MAYOR.

3.0 CITY ORDINANCE. APPROVAL OF CONTRACTS BY MAYOR, SEC. 3-12 OF THE CITY ORDINANCES.

- A All contract made by any department, board or commission where the amount involved is two thousand dollars (\$2,000) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the Mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the contract exceed five thousand dollars (\$5,000) be required to be accompanied by a bond with sureties satisfactory to the Mayor

Signature of Individual or Corporate

Name By:

(Signature of Corporate Officer if applicable)

Title: _____

Social Security Number or Federal Identification Number: _____

END OF SECTION

Section 00200

Compliance

The documents in this section shall bear "wet" Original signatures and returned with your bid

Compliance

The compliance documents in this section must be completed, signed and returned **with your bid package.**

Purchasing Department

City of Waltham
610 Main Street
Waltham, MA 02452

Failure to submit the completed documents will cause the disqualification of the proposal.

Section Index

Check when Complete

- Non-collusion form and Tax Compliance form..... _____
- Corporation Identification Form..... _____
- Certificate of Vote Authorization..... _____
- Certificate of Insurance (showing all limits of WC &GL)..... _____
- Three (3) References..... _____
- 5% Bid Bond or Certified Check>..... _____
- Debarment Certificate _____
- Prevailing Wage Certificate..... _____
- Right-to-know Law..... _____
- OSHA 10 Certificate for all Assigned Employees (MGL ch30, §39M and Ch 149) _____

Before the commencement of the Job, the contractor must provide to the above office:

- Performance and Payment Bonds **each** for 100% of the contract value and naming the City of Waltham

Your Company's Name: _____

Service or Product Bid _____

NOTE: Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

NON-COLLUSION FORM AND TAX COMPLIANCE FORM

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity or group of individuals. The undersigned certifies that no representations made by any City officials, employees, entity, or group of individuals other than the Purchasing Agent of the City of Waltham was relied upon in the making of this bid

_____, _____
(Signature of person signing bid or proposal) Date

(Name of business)

Wet Signature Required

TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c. 62C, & 49A, I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

_____, _____
Signature of person submitting bid or proposal Date

Name of business

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

CERTIFICATE OF VOTE OF AUTHORIZATION

Date:

I _____, Clerk of _____ hereby certify that at a meeting of the Board of Directors of said Corporation duly held on the _____ day of _____ at which time a quorum was present and voting throughout, the following vote was duly passed and is now in full force and effect:

VOTED: That _____ (*name*) is hereby authorized, directed and empowered for the name and on behalf of this Corporation to sign, seal with the corporate seat, execute, acknowledge and deliver all contracts and other obligations of this Corporation; the execution of any such contract to be valid and binding upon this Corporation for all purposes, and that this vote shall remain in full force and effect unless and until the same has been altered, amended or revoked by a subsequent vote of such directors and a certificate of such later vote attested by the Clerk of this Corporation.

I further certify that _____ is duly elected/appointed _____ of said corporation

SIGNED:

(Corporate Seal)

Clerk of the Corporation:

Print Name: _____

COMMONWEALTH OF MASSACHUSETTS

County of _____

Date:

Then personally appeared the above named and acknowledged the foregoing instrument to be their free act and deed before me, _____

Notary Public;

My Commission expires: _____

CORPORATION IDENTIFICATION

The bidder for the information of the Awarding Authority furnishes the following information.

If a Corporation:

Incorporated in what state _____

President _____

Treasurer _____

Secretary _____

Federal ID Number _____

If a foreign (out of State) Corporation – Are you registered to do business in Massachusetts?

Yes _____, No _____

If you are selected for this work you are required under M.G.L.ch. 30S, 39L to obtain from the Secretary of State, Foreign Corp. Section, State House, Boston, a certificate stating that you Corporation is registered, and furnish said certificate to the Awarding Authority prior to the award.

If a Partnership: (Name all partners)

Name of partner _____

Residence _____

Name of partner _____

Residence _____

If an Individual:

Name _____

Residence _____

If an Individual doing business under a firm's name:

Name of Firm _____

Name of Individual _____

Business Address _____

Residence _____

Date _____

Name of Bidder _____

By _____

Signature _____

Title _____

Business Address _____ (POST OFFICE BOX NUMBER NOT ACCEPTABLE)

State Telephone Number _____

Today's Date _____

The Bidder is required to list three or more of their firm's recent projects involving the rehabilitation of precast, prestressed concrete tanks conforming to AWWA D110, Type III with a minimum capacity of 1.0 MG. The record shall indicate the size of the tank, the name and address of the OWNER, the year of rehabilitation, and the name of the ENGINEER for each project. Experience in the rehabilitation of AWWA D110 Type I or Type IV tanks will not be acceptable.

PROVIDE THREE (3) SERVICE APPROPRIATE REFERENCES

1. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

2. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

3. Company Name:

Address:

Contact Name:

Phone #

Type of service/product provided to this Company:

Dollar value of service provided to this Company:

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.

**WEEKLY PAYROLL RECORDS REPORT &
STATEMENT OF COMPLIANCE**

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided, A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit, on a weekly basis, a copy of his or her weekly payroll records to the awarding authority. For every week in which an apprentice is employed, a photocopy of the apprentice's identification card must be attached to the payroll report. Once collected, the awarding authority is also required to preserve those reports for three years.

In addition, each such contractor, subcontractor, or public body shall furnish to the awarding authority directly, within fifteen days after completion of its portion of the work, a statement, executed by the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

_____, 20____

I _____,
(Name of signatory party) (Title)

I do hereby state that I pay or supervise the payment of the persons employed by

_____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____, Title _____

Print _____

WEEKLY PAYROLL REPORT FORM

Company Name: _____
 Prime Contractor
 Project Name: _____
 Subcontractor
 Awarding Auth.: _____
 List Prime Contractor: _____
 Work Week Ending: _____
 Employer Signature: _____
 Final Report
 Print Name & Title: _____

Employee Name & Address	Work Classification	Hours Worked							(A) Tot. Hrs.	(B) Hourly Base Wage	Employer Contributions			(F) [B+C+D+E] Hourly Total Wage (prev. wage)	(G) [A * F] Weekly Total Amount
		S	M	T	W	T	F	S			(C) Health & Welfare	(D) Pension	(E) Supp. Unemp.		

NOTE: Every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority.

RIGHT TO KNOW LAW

Any vendor who receives an order or orders resulting from this invitation agrees to submit a Material Safety Data Sheet (MSDS) for each toxic or hazardous substance or mixture containing such substance, pursuant to M.G.L. c. 111F, §§8,9 and 10 and the regulations contained in 441 CMR 21.06 when deliveries are made. The vendor agrees to deliver all containers properly labeled pursuant to M.G.L. c. 111F §7 and regulations contained in 441 CMR 21.05. Failure to furnish MSDS and/or labels on each container may result in civil or criminal penalties, including bid debarment and action to prevent the vendor from selling said substances, or mixtures containing said substances within the Commonwealth. All vendors furnishing substances or mixtures subject to Chapter 111F or M.G.L. are cautioned to obtain and read the laws, rules and regulations referenced above. Copies may be obtained from the State House Bookstore, Secretary of State, State House, Room 117, Boston, MA (617) 727-2834.

Authorized Signature Indicating Compliance with the Right-to-know laws:

Signature Date

Print Name

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

DEBARMENT CERTIFICATION

In connection with this bid and all procurement transactions, by signature thereon, the respondent certifies that neither the company nor its principals are suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from the award of contracts, procurement or non procurement programs from the Commonwealth of Massachusetts, the US Federal Government and /or the City of Waltham. "Principals" means officers, directors, owners, partners and persons having primary interest, management or supervisory responsibilities with the business entity. Vendors shall provide immediate written notification to the Purchasing Agent of the City of Waltham at any time during the period of the contract of prior to the contract award if the vendor learns of any changed condition with regards to the debarment of the company or its officers. This certification is a material representation of fact upon which reliance will be placed when making the business award. If at any time it is determined that the vendor knowingly misrepresented this certification, in addition to other legal remedies available to the city of Waltham, the contract will be cancelled and the award revoked.

Company Name _____

Address _____

City _____, State _____, Zip Code _____

Phone Number (____) _____

E-Mail Address _____

Signed by Authorized Company Representative:

Print name _____,

Date _____

10 HOURS OSHA TRAINING CONFIRMATION

Chapter 306 of the Acts of 2004

CONSTRUCTION PROJECTS

AN ACT RELATIVE TO THE HEALTH AND SAFETY ON PUBLIC

The undersigned hereby certifies that all employees to be employed at a worksite for construction, reconstruction, alteration, remodeling, repair, installation, demolition, maintenance or repair of any public work or any public building estimated to cost more than \$10,000.00 have successfully completed a course in construction safety and health approved by the **United States Occupational Safety and Health Administration** that is at least **10 hours** in duration at the time the employee begins work and who shall furnish documentation of successful completion of said course with the first payroll report for each employee and will comply with all laws and regulations applicable to awards of subcontracts subject to section 44F.

Company Name: _____

Address: _____

Signature: _____

Title: _____

Print Name _____

Date _____

See Chapter 306 of the Acts of 2004

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.

SECTION 00300

BID FORM

To the City of Waltham, Massachusetts:

Regarding: **Cedarwood Water Storage Tank Rehabilitation Project**

The Owner reserves the right to reject any bid in the event that any bid item or items are obviously unbalanced or appear to the Owner to be so unbalanced as to affect or to be liable to affect adversely any interest of the Owner.

The Owner reserves the right to reject any or all bids if it deems it to be in its best interest to do so. The Owner reserves the right to award the Contract based on sufficiency of appropriated funds to complete the work.

The undersigned states that no officer, agent, or employees of the Owner directly or indirectly have a financial interest in this Bid.

The undersigned, as Contractor, declares as follows:

- The only parties interested in this Bid as Principals are named herein.
- This Bid is made without collusion with any other person, firm, or corporation.
- No officer, agent, or employee of the Owner is directly or indirectly interested in this Bid.
- The Contractor has carefully examined the proposed Work and fully informed and satisfied himself as to the conditions there existing, the character and requirements of the proposed Work, the difficulties attendant upon its execution and the accuracy of all estimated quantities stated in this Bid and has carefully read and examined the annexed proposed AGREEMENT and the Specifications and other Contract Documents therein referred to and knows and understands the terms and provisions thereof.
- Understands that information relative to subsurface and other conditions, natural phenomena, existing pipes, and other structures (surface and/or subsurface) has been furnished only for his information and convenience without any warranty or guarantee, expressed or implied, that the subsurface and/or other conditions, natural phenomena, existing pipes, and other structures (surface and/or subsurface) actually encountered will be the same as those shown within the Contract Documents and agrees that the Contractor shall not use or be entitled to use any such information made available to him through Contract Documents or otherwise or obtained by him in his own examination of the site, as a basis of or ground for any claim against the Owner of the Engineer arising from or by reason of any variance which may exist between the aforesaid information made available to or acquired by him and the subsurface and/or other conditions, natural phenomena, existing pipes, and other structures (surface and/or subsurface) actually encountered during the construction work, and has made due allowance therefore in this BID.
- The Contractor understands that the quantities of work tabulated in this Bid or indicated in the Specifications of other Contract Documents are only approximate and are subject to increase or decrease as deemed necessary by the Engineer.

- The Contractor agrees that, if this BID is accepted, they will contract with the Owner, as provided in the copy of the Contract Documents deposited in the office of the Engineer, this BID from being part of said Contract Documents, and that the Contractor will perform all the work and furnish all the materials and equipment, and provide all labor, services, plant, machinery, apparatus, appliances, tools, supplies, and all other things required by the Contract Documents in the manner and within the time therein prescribed and according to the requirements of the Engineer as therein set forth, and that the Contractor will take in full payment therefore the lump sum or unit price applicable to each item of the Work as stated in the schedule below.

Contractors must bid on each Item.

Refer to Section 01024 for Measurement and Payment for Item Descriptions.

BASE SCOPE OF WORK BID FORM

The Base Bid includes all the work of the Contractor, being all work covered by Items 1 through 17, inclusive.

Cedarwood Water Storage Tank Rehabilitation Project

ITEM NO.	**** QUANTITY	UNIT	ITEM DESCRIPTION WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES	EXTENDED AMOUNT
1	1	EACH	MOBILIZATION/DEMobilIZATION AT per each		
2A	1	EACH	EXTERIOR TANK COATING SYSTEM AT per each		
2B	1	EACH	INTERIOR TANK COATING SYSTEM AT per each		
3	20	EACH	STEEL TANK PIT REPAIR AT per each		
4A	1	EACH	SEAL CONCRETE FOUNDATION AT per each		
4B	1	EACH	SEAL STEEL TANK ROOF SEAMS AT per each		
5	1	EACH	GROUT CONCRETE FOUNDATION AT per each		
6	1	EACH	TANK MIXING SYSTEM AT per each		
7	1	EACH	EXTERIOR OSHA COMPLIANT LADDER AT per each		
8	1	EACH	OVERFLOW PIPE UPGRADES AT per each		
9	1	EACH	ROOF HANDRAIL AND WALKWAY SYSTEM AT per each		
10	1	EACH	VALVE VAULT ACCESS HATCH REPLACEMENT AT per each		
11	1	EACH	PRESSURE/LEVEL TRANSMITTER IN VAULT AT per each		

ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION WITH UNIT BID PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES	EXTENDED AMOUNT
12	1	EACH	TANK SAMPLE TAP AND ENCLOSURE AT per each		
13	1200	SF	ACCESS DRIVE EROSION CONTROL MATTING AT per square foot		
14	1	EACH	TEMPORARY RELOCATE AND RESET ANTENNAS AT per each		
15	1	EACH	MISCELLANEOUS ITEMS AT per each		
16	1	ALLOW	ADDITIONAL REPAIRS AT <u>Seventy-Five Thousand Dollars</u> Per allowance	\$75,000.00	\$75,000.00
17	1	ALLOW	POLICE DETAILS AT <u>Twenty-Five Thousand Dollars</u> Per allowance	\$25,000.00	\$25,000.00
TOTAL BASE BID:					
(Basis for determining lowest bid)					

Price written in:

Words (Dollars and Cents)

Figures

*** Indeterminate quantities. These quantities are not guaranteed. Payment will be based on actual quantities constructed. ***

Basis of Award: The basis of award shall be at the Owner's sole discretion. The Contractor hereby agrees that he will not withdraw this BID within thirty (30) consecutive calendar days after the actual date of the opening of Bids and that, if the Owner shall accept this BID, the Contractor will duly execute and acknowledge the AGREEMENT and furnish, duly executed and acknowledge, the required CONTRACT BONDS within ten (10) calendar days after notification that the AGREEMENT and other Contract Documents are Ready for signature.

If this BID is accepted by the Owner, the undersigned agrees to substantially complete work provided to be done under the Contract within **180 calendar days**, as stipulated in the AGREEMENT. For the Contractor to perform this work, the Cedarwood water storage tank will be taken offline and drained on May 22, 2024 and shall be placed back into service by August 31, 2024.

A performance bond in an amount equal to 100% of the total amount of the bid with a surety company qualified to do business in the Commonwealth of Massachusetts will be required for the faithful performance of the contract, as well as a labor and materials bond in an amount equal to 100% of the total bid amount.

This Proposal must bear the written signature of the Contractor or that of his duly authorized agent. If the Contractor is a corporation or a partnership, the Bid must be signed by a duly authorized officer of such corporation or by a Partner and the title of such officer must be stated. Satisfactory completion of the following data is an essential part of submission of this Proposal and is required. Bid must be embossed with corporate seal.

(SEAL)

(Name of Contractor)

By: _____
(Signature and title of authorized representative)

Date: _____

(Telephone Number)

(Business Address)

(Fax Number)

(City and State)

END OF SECTION 00300

SECTION 00500

FORM OF AGREEMENT

**EJCDC
FORM OF AGREEMENT
BETWEEN OWNER AND CONTRACTOR FOR
CONSTRUCTION CONTRACT (STIPULATED PRICE)
FUNDING AGENCY EDITION**

THIS AGREEMENT is by and between City of Waltham (Owner)

and _____ (Contractor).

Owner and Contractor, in consideration of the mutual covenants set forth herein, agree as follows:

ARTICLE 1 - WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

In general, and without limitation, the work to be done under this contract includes the rehabilitation of the 2-million-gallon steel standpipe tank located in Cedarwood in Waltham, Massachusetts.

ARTICLE 2 - THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

The tank rehabilitation project includes the application of new interior and exterior coating systems, sealing of the foundation and roof seams, tank mixing system, OSHA-compliant ladder, roof safety handrails, modifications to the overflow pipe discharge, replacement of the valve vault hatch, pressure transmitter in valve vault and miscellaneous site work.

ARTICLE 3 - ENGINEER

3.01 The Project has been designed by H2Olson Engineering, Inc., who is to act as Owner's representative, assume all duties and responsibilities, and have the rights and authority assigned to Engineer in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIMES

4.01 Time of the Essence

- A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Days to Achieve Substantial Completion and Final Payment

- A. The Work will be substantially completed within 180 consecutive calendar days from issuance of a Notice to Proceed. For the Contractor to perform this work, the Cedarwood water storage tank will be taken offline and drained on May 22, 2024. The rehabilitation work shall be completed and the tank placed back in service by August 31, 2024.

4.03 Liquidated Damages

- A. Contractor and Owner recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 4.02 above, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner \$1,000.00 for each day that expires after the time specified in Paragraph 4.02 for Substantial Completion until the Work is substantially complete.

ARTICLE 5 - CONTRACT PRICE

- A. For all Work, at the prices stated in the Contractor's Bid, included in Document 00300 Bid Form.

ARTICLE 6 - PAYMENT PROCEDURES

6.01 Submittal and Processing of Payments

- A. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.
- B. Each application for payment shall be accompanied by an Updated Cash Flow Projection, estimating the future monthly payments to the Contractor for the remainder of the project.

6.02 Progress Payments; Retainage

A. Owner shall make monthly progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment, which shall be submitted to the Owner on the first workday of each month during performance of the Work as provided in Paragraphs 6.02.A.1 and 6.02.A.2 below. All such payments will be measured by the schedule of values established as provided in Article 2 of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements:

- 1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Engineer may determine or Owner may withhold, including but not limited to liquidated damages, in accordance with Paragraph 15.01 of the General Conditions:
 - a. 95% of Work completed (with the balance being retainage); and
 - b. 95% of cost of materials and equipment not incorporated in the Work (with the balance being retainage).

2. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to 95% of the Work completed, less such amounts as Engineer shall determine in accordance with Article 15 of the General Conditions.

3. Owner will make no further payments to Contractor for a period of one year following such time as Contractor, in the opinion of Engineer, has satisfactorily completed all corrections identified in the final inspection, and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Article 7 of the General Conditions), and other documents.

6.03 Final Payment

A. Upon receipt of the final Application for Payment accompanied by Engineer's recommendation of payment in accordance with Paragraph 15.06 of the General Conditions, Owner shall pay Contractor as provided in Paragraph 15.06 of the General Conditions the remainder of the Contract Price as recommended by Engineer as provided in said Paragraph 15.06, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages.

ARTICLE 7 – INTEREST - Omitted

ARTICLE 8 – CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce Owner to enter into this Agreement Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Contractor has obtained and carefully studied (or assumes responsibility for doing so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents, and safety precautions and programs incident thereto.

E. Contractor does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

F. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

G. Contractor has correlated the information known to Contractor, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

H. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

I. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 9 - CONTRACT DOCUMENTS

9.01 Contents

A. The Contract Documents consist of the following:

1. This Agreement (pages 1 to 6, inclusive)
2. General Conditions (pages 1 to 65, inclusive)
3. Supplementary Conditions (pages 1 to 13, inclusive)
4. Technical Specifications as listed in the table of contents of the Specifications
5. Drawings consisting of 3 sheets bearing the following general title: Cedarwood Water Storage Tank Rehabilitation Project, Waltham, Massachusetts. (Appendix C)
6. Addenda (numbers to , inclusive).
7. Exhibits to this Agreement (enumerated as follows):
 - a. Notice of Award (pages 1 to 1, inclusive)
 - b. Contractor's Bid (pages 1 to 5, inclusive)
8. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto:
 - a. Notice to Proceed (pages 1 to 1, inclusive)
 - b. Application for Payment
 - c. Work Change Directives
 - d. Change Order(s)
 - e. Certificate of Substantial Completion
 - f. Waiver of Liens

g. Certificate of Final Payment and Completion of Work

- B. The documents listed in Paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).
- C. There are no Contract Documents other than those listed above in this Article 9.
- D. The Contract Documents may only be amended, modified, or supplemented as provided in Paragraph 3.04 of the General Conditions.

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

A. Terms used in this Agreement will have the meanings stated in the General Conditions and the Supplementary Conditions.

10.02 Assignment of Contract

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 Successors and Assigns

A. Owner and Contractor each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 Severability

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision. IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement in four copies. One counterpart each has been delivered to Owner, Contractor, Engineer, and Agency. All portions of the Contract Documents have been signed, initialed, or identified by Owner and Contractor or identified by Engineer on their behalf.

This Agreement will be effective _____, 2024 (which is the Effective Date of the Agreement). Witnesseth, that the parties to this agreement, each in consideration of the agreement on the part of the others herein contained, do hereby agree, the CITY OF WALTHAM for itself, and said contractor for his heirs, executors, administrators, and assigns as follows:

CITY OF WALTHAM, MASSACHUSETTS

FOR THE CITY

Jeannette A. McCarthy, Mayor

City of Waltham

Date: _____

John Cervone, City Solicitor

Date: _____

APPROVED AS TO FORM ONLY

Robert S. Winn, PE, City Engineer

Date: _____

Crystal Philpott, Purchasing Agent

Date: _____

Paul Centofanti, Auditor

Date: _____

I CERTIFY THAT SUFFICIENT FUNDS ARE AVAILABLE FOR THIS CONTRACT

END OF SECTION 00500

Section 00540
LIQUIDATED DAMAGES

Should a Contractor fail to complete his work on or before the time set forth or as provided in the Contract Documents covering extension of time, the Owner may retain an amount of \$500.00 per calendar day as liquidated damages for each calendar day in accordance with the provisions of that section.

SECTION 00550

NOTICE OF AWARD

TO:

DATE:

PROJECT DESCRIPTION: Cedarwood Water Storage Tank Rehabilitation Project

The Owner has considered the Proposal submitted by you for the above-described Work on _____ in response to its Advertisement for Bids and Instructions to Bidders.

You are hereby notified that your Proposal has been accepted for Items totaling the amount of: \$ _____

You are required by the Instructions to Bidders to execute the Contract Agreement and furnish the required Contractor's Performance Bond, Payment Bond, and certificates of insurance within ten (10) days from the date of this Notice of Award.

If you fail to execute said Agreement and to furnish said Bonds and Insurance within ten (10) days from the date of this Notice, said Owner will be entitled to consider all your rights arising out of the Owner's acceptance of your Proposal as abandoned and as a forfeiture of your Bid Bond. The Owner will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to the Owner. Dated this _____ day of _____, 2024.

By Its Director of Public Works:

Director of Public Works

Date

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged, this, the ___ day of _____, 2024.

By: _____

Title: _____

NOTICE TO PROCEED

TO:

DATE:

PROJECT: Cedarwood Water Storage Tank Rehabilitation Project

You are hereby notified to commence the Work in accordance with the Agreement dated _____, on or before _____, and you are to complete all work within **one hundred and eighty (180)** consecutive calendar days thereafter. The date of completion of all work is, therefore, _____.

City of Waltham, Massachusetts

By: _____
Director of Public Works

END OF SECTION 00550

SECTION 0 06 10

PERFORMANCE BOND

CITY OF WALTHAM

KNOW ALL PERSONS BY THESE PRESENT THAT,

_____ as

principal and _____ as surety, are held and firmly bound unto the CITY OF WALTHAM and to such persons, firms, and corporations, who may furnish materials for or perform labor on the work, construction or improvements contemplated in the Contract hereinafter mentioned, or who may have any suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, in the

SUM OF _____ DOLLARS (\$ _____)

(lawful money of the United States of America) for the payment whereof the Contractor and the Surety of Sureties bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT for the above burden (the Contractor) its

_____ heirs, executors, administrators and assigns, shall faithfully perform the Contract, on his part and during the life of any guaranty or warranty, for defective materials and workmanship required under this Contract, and satisfy all claims and demands incurred for the same; and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of failure so to do, and shall fully reimburse and repay the City all outlay and expense which the City may incur in making good any such default, and shall promptly make payment to all persons supplying labor or materials for use in the prosecution of the work provided for in said Contract; and shall indemnify and save harmless the said City, its officers and agents from any and all suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that (except as to the City) no suit, action or proceeding by reason of any default whatever shall be brought on this Bond after two years from the day on which the final payment under the Contract falls due.

AND PROVIDED, that any alterations which may be made in the terms of the Contract or in the work to be done under it, or any assignment, transfer or subletting of any part of the work, or the giving by the City of any extension of time for the performance of the Contract, or any other forbearance on the part of either the City or the Contractor to the other, shall not in any way release the Contractor and the Surety of Sureties, or either or any of them, their heirs, executors, administrators, successors or assigns from their liability hereunder, notice to the Surety or Sureties of any such alterations, assignment, transfer, subletting extension or forbearance being hereby waived.

This Bond is made for the use and benefit of all persons, firms, and corporations who may furnish materials, or perform any labor for or on account of said work, construction or improvements, or who may have any suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, and they and each of them are hereby made obligees hereunder the same as if their own proper names were written herein as such, and they and each of them may sue hereon in their own names for their own use and benefit.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed hereunder, or the Specifications accompanying the same, shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such changes, extension of time, alteration or addition to the terms of the Contract or to the work, or to the Specifications.

IN WITNESS WHEREOF, said Contractor and Surety have hereunto set their respective names this

_____ day of _____, 20_____.

WITNESSES:

(CONTRACTOR) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____
(SURETY) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____ BY _____
(ATTORNEY-IN-FACT)

POWER OF ATTORNEY

Attorneys-in-fact who sign bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

SECTION 00615

PAYMENT BOND

CITY OF WALTHAM

KNOW ALL PERSONS BY THESE PRESENT THAT,

_____ as

principal and _____ as
surety, are held and firmly bound unto the CITY OF WALTHAM and to such persons, firms, and
corporations, who may furnish materials for or perform labor on the work, construction or
improvements contemplated in the Contract hereinafter mentioned, or who may have any suits
or claims for injury or damage to persons or property resulting from or arising out of the work
done under this Contract, in the

SUM OF _____ DOLLARS (\$ _____)
(lawful money of the United States of America) for the payment whereof the Contractor and the
Surety of Sureties bind themselves and their heirs, executors, administrators, successors and
assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT for the above burden (the Contractor) its

heirs, executors, administrators and assigns, shall faithfully perform the Contract, on his part and
during the life of any guaranty or warranty, for defective materials and workmanship required under
this Contract, and satisfy all claims and demands incurred for the same; and shall fully indemnify and
save harmless the City from all cost and damage which it may suffer by reason of failure so to do,
and shall fully reimburse and repay the City all outlay and expense which the City may incur in
making good any such default, and shall promptly make payment to all persons supplying labor or
materials for use in the prosecution of the work provided for in said Contract; and shall indemnify
and save harmless the said City, its officers and agents from any and all suits or claims for injury or
damage to persons or property resulting from or arising our of the work done under this Contract,
then this obligation shall be null and void; otherwise it shall remain in full force and effect.

PROVIDED, HOWEVER, that (except as to the City) no suit, action or proceeding by reason of any
default whatever shall be brought on this Bond after two years from the day on which the final
payment under the Contract falls due.

AND PROVIDED, that any alterations which may be made in the terms of the Contract or in the work to
be done under it, or any assignment, transfer or subletting of any part of the work, or the giving by the
City of any extension of time for the payment of the Contract, or any other forbearance on the part of
either the City or the Contractor to the other, shall not in any way release the Contractor and the
Surety of Sureties, or either or any of them, their heirs, executors, administrators, successors or
assigns from their liability hereunder, notice to the Surety or Sureties of any such alterations,
assignment, transfer, subletting extension or forbearance being hereby waived.

This Bond is made for the use and benefit of all persons, firms, and corporations who may furnish
materials, or perform any labor for or on account of said work, construction or improvements, or who

may have any suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, and they and each of them are hereby made obligees hereunder the same as if their own proper names were written herein as such, and they and each of them may sue hereon in their own names for their own use and benefit.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the work to be performed hereunder, or the Specifications accompanying the same, shall in any way affect its obligations on this Bond, and it does hereby waive notice of any such changes, extension of time, alteration or addition to the terms of the Contract or to the work, or to the Specifications.

IN WITNESS WHEREOF, said Contractor and Surety have hereunto set their respective names this

_____ day of _____, 20_____.

WITNESSES:

(CONTRACTOR)

(SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____
(SURETY) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____ BY _____
(ATTORNEY-IN-FACT)

POWER OF ATTORNEY

Attorneys-in-fact who sign bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

SECTION 00700

GENERAL CONDITIONS

1. INFORMATION

All information shall come from the Office of the City Purchasing Agent. The Contractor shall inquire at this office for any information needed. Wherever the words "or equal as approved" are used, it is to be understood that the opinion of the City Purchasing Agent shall govern.

2. SUITS

The Contractor shall assume defense of and shall indemnify and hold the City and its agents harmless from all suits and claims against the City and its sub-contractors arising from the use of any invention, patent right labor or employment, or from any act of omission or neglect of the City, its agents, employees or any subcontractor in performing the work, under this contract.

3. LAWS AND REGULATIONS

The Contractor shall conform to all the applicable rules, regulations, laws and ordinances of the City of Waltham, the Commonwealth of Massachusetts, the United States of America and all agencies having jurisdiction over this contract.

4. PROTECTION OF PROPERTY

The Contractor shall take all proper precautions to protect the City's property from damage and unnecessary inconvenience. Any City property damaged by the Contractor in carrying out the provisions of this contract shall be restored to its original condition, by and at the expense of the Contractor.

5. PROTECTION OF PERSONS

The Contractor shall take all proper precautions to protect persons from injury, unnecessary inconvenience, and shall be responsible for his failure to do so. The Contractor agrees to hold the City harmless from any and all liabilities of every nature and description, which may be suffered through bodily injury, including death, to any person, by reason of negligence of the Contractor, his agents or employees, or any subcontractor.

6. INSURANCE

A. **WORKMAN'S COMPENSATION:** The Contractor shall provide by insurance for the payment of compensation and furnishing of other benefits under Chapter 152 of the General Laws of the Commonwealth of Massachusetts to all persons to be employed under this contract, the premiums for which shall be paid by the Contractor.

B. **COMPREHENSIVE GENERAL LIABILITY**

Bodily Injury:	\$1,000,000 Each Occurrence
	\$2,000,000 Aggregate
Property Damage:	\$1,000,000 Each Occurrence
	\$2,000,000 Aggregate

C. **AUTOMOBILE (VEHICLE) LIABILITY**

Bodily Injury	\$2,000,000 Each Occurrence
Property Damage	\$1,000,000 Aggregate

D. **UMBRELLA POLICY**

General liability	\$2,000,000
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Your bid response must include a Certificate of Insurance with the above limits as a minimum. In addition, the Certificate of Insurance must have the following text contained in the bottom left box of the Certificate: [“The City of Waltham is a Named Additional Insured for all Insurance”](#). The Certificate of Insurance must be mailed directly to:

Office of the Purchasing Agent
Purchasing Department
City of Waltham
610 Main Street
Waltham, MA 02452

7. LABOR AND MATERIALS BOND

The Contractor agrees to execute and deliver to the City, a Performance Bond and a Labor and Materials Bond equal to 100% of the contract value. This contract shall not be in force until said bond has been delivered and accepted by the City. Bond to be issued by a company licensed by the Commonwealth of Massachusetts.

A LETTER FROM A SURETY COMPANY CERTIFYING THAT THE CONTRACTOR IS QUALIFIED AND CAPABLE OF OBTAINING THE ABOVE BONDS MUST BE INCLUDED WITH HIS/HERS BID.

8. PERSONNEL:

The Contractor shall employ a competent supervisor and all properly licensed personnel necessary to perform the services required in this contract. The City Purchasing Agent shall have the right to require the Contractor to remove and/or replace any of the personnel for nonperformance or for unprofessional behavior. The City Purchasing Agent may require the Contractor to submit a weekly performance record of the areas and of the work performed, on forms approved by the City Purchasing Agent. The Contractor or his supervisor shall be available to inspect such work as required by the City Purchasing Agent.

9. PREVAILING WAGES

The Contractor is required to pay the prevailing wages as determined under the provisions of Chapter 149, Sections 26 and 27D of the Massachusetts General Laws, including the submission of weekly payrolls to the awarding authority. Copies of the Prevailing Wage Schedule is found on line at www.city.waltham.ma.us/open-bids

10. MATERIALS

The City or its Agent reserves the right to approve or reject any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any supplies, material or equipment used by the Contractor. The Contractor agrees to replace any rejected supplies, materials or equipment, to the satisfaction of the City or its Agents.

11. TERMINATION OF CONTRACT

This contract may be terminated by the City upon deliverance to the Contractor of a five-day written notice of said termination.

12. CONTRACT OBLIGATIONS

Contract obligations on behalf of the City are subject to an annual appropriation to cover the contract obligation.

13. BIDDER EXPERIENCE EVALUATION

Each bidder shall submit with his bid, all the information relative to their experience and qualifications in performing the work required under this contract and shall have been in business for a minimum of five (5) years, in order for their bid to be considered.

14. NOT-TO-EXCEED AMOUNT

The bid amount proposed in your company's response is a "not-to- Exceed" amount unless the City makes changes, in writing, to the scope of work to be performed. The Change Order must be signed and approved by the City's Purchasing Agent, City Auditor, Law Department and the Mayor prior to the commencement of the change order work. No work is to begin until the proper approvals have been obtained. A change order will be priced at the unit price. Failure to comply with this procedure will result in the cancellation of the contract and the non-payment of services provided

A. FINANCIAL STATEMENTS.

The City may require, within five (5) days after the bid opening, a complete and detailed Financial Statement prepared by a Certified Public Account, to determine a bidder's financial stability.

21 BREACH OF CONTRACT/ NON PERFORMANCE

If the Contractor shall provide services in a manner, which is not to the satisfaction of the City, the City may request that the Contractor refurnish services at no additional cost to the City until approved by the City. If the Contractor shall fail to provide services, which are satisfactory to the City, the City in the alternative may make any reasonable purchase or Contract to purchase services in substitution for those due from the Contractor. The City may deduct the cost of any substitute Contract for nonperformance of services together with incidental and consequential damages from the Contract price and shall withhold such damages from sums due or to become due to the Contractor. If the damages sustained by the City exceed sums due or to become due, the Contractor shall pay the difference to the City upon demand. The Contractor shall not be liable for any damages sustained by the City due to the Contractor's failure to furnish services under the terms of this Contract if such failure is in fact caused by the occurrence of a contingency the nonoccurrence of which was a basic assumption under which this Contract was made, including a state of war, embargoes, expropriation of labor strike or any unanticipated federal, state or municipal governmental regulation of order, provided that the Contractor has notified the City in writing of such cause within seven (7) days after its occurrence.

22 RIGHT TO AUDIT

The City of Waltham has the right to review and audit documents related to this contract. This right extends to any subcontractor, supplier or other entity used by the prime contractor to fulfill the obligations under this contract.

19. CITY ORDINANCE. APPROVAL OF CONTRACTS BY MAYOR, SEC. 3-12 OF THE CITY ORDINANCES.

All contract made by any department, board or commission where the amount involved is two thousand dollars (\$2,000) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the Mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the contract exceed five thousand dollars (\$5,000) be required to be accompanied by a bond with sureties satisfactory to the Mayor.

20. BID OPENING INCLEMENT WEATHER

If, at the time of the originally scheduled bid opening, City Hall is closed to inclement weather or another unforeseeable event, the bid opening will be extended until 2:00 PM on the next normal business day. Bids will be accepted until that date and time.

21 FUNDS APPROPRIATION.

THE CONTRACT OBLIGATION ON BEHALF OF THE CITY IS SUBJECT TO PRIOR APPROPRIATION OF MONIES FROM THE GOVERNMENTAL BODY AND AUTHORIZATION BY THE MAYOR.

22 THE AWARDING AUTHORITY RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS, OR ANY PART OF ANY BID, WHICH IN THE OPINION OF THE AWARDING AUTHORITY, IS IN THE BEST INTERESTS OF THE CITY OF WALTHAM.



SECTION 00700
STANDARD GENERAL CONDITIONS OF THE
CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5101 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner’s acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor’s plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or “RPR” includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer’s review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 Terminology

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or

computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 *Reference Standards*

- A. Standards Specifications, Codes, Laws and Regulations
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*
 - 1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict,

error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

- A. Contractor and its Subcontractors and Suppliers shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
 - 2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Contract or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Contract. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 2. abnormal weather conditions;
 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

- 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
- 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part

by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

- c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
 - 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 - 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.I shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

- G. *Additional insureds*: The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance*: If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions*: The policies of insurance required by this Paragraph 6.03 shall:
 - 1. include at least the specific coverages provided in this Article.
 - 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 - 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 - 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 - 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk*: Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or equal" item is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
- B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
- C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 - 3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
 - d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

- O. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to

provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples:*
 - a. Contractor shall submit the number of Samples required in the Specifications.
 - b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.
3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.
- D. *Engineer's Review:*
 1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
 2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
 3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
 4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
 5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
 6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
 7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 - 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 - 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner for whom the Owner is responsible causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during

or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.04.C.2.a and 11.04.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 Execution of Change Orders

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 - 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim

submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 *Cost of the Work*

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes

other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

- C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:
- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
 - 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
 - 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
 - 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
 - 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.
- D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.
- E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 - 3. by manufacturers of equipment furnished under the Contract Documents;
 - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation:* It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority:* Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects:* Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement:* Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties:* When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages:* In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require additional inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will

include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 Progress Payments

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications:*
1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
 4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
 5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
 6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
 - a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

- e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner:*

- 1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.
- 2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount

remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

- A. *Application for Payment:*
 - 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for

expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

18.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract. The provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00810

SUPPLEMENTAL CONDITIONS

Unless otherwise noted, all paragraphs are additive to similarly numbered paragraphs in SECTION 00700 – GENERAL CONDITIONS. These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract (EJCDC C-700, 2013, Rev1 Edition) and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.

The terms used in these Supplementary Conditions have the meanings indicated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings indicated below, which are applicable to both the singular and plural thereof.

PART I AMENDMENTS TO GENERAL CONDITIONS

Article No.

- 1.0 DEFINITIONS AND TERMINOLOGY
- 2.0 PRELIMINARY MATTERS
- 3.0 DOCUMENTS: INTENT, REQUIREMENTS AND REUSE
- 4.0 COMMENCEMENT AND PROGRESS OF WORK
- 5.0 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS;
HAZARDOUS ENVIRONMENTAL CONDITIONS
- 6.0 BONDS AND INSURANCE
- 7.0 CONTRACTOR’S RESPONSIBILITIES
- 8.0 OTHER WORK AT THE SITE
- 9.0 OWNERS RESPONSIBILITIES
- 10.0 ENGINEER’S STATUS DURING CONSTRUCTION
- 11.0 AMMENDING CONTRACT DOCUMENTS: CHANGES IN WORK
- 12.0 CLAIMS
- 13.0 COST OF WORK:ALLOWANCES: UNIT PRICE WORK
- 14.0 TEST AND INSPECTIONS
- 15.0 PAYMENTS TO CONTRACTOR
- 16.0 SUSPENSION OF WORK AND TERMINATION
- 17.0 FINAL RESOLUTION OF DISPUTES
- 18.0 MISCELLANEOUS

PART II ADDITIONS TO GENERAL CONDITIONS

PART III STATE AND FEDERAL GOVERNMENT PROVISIONS

PART I AMENDMENTS TO GENERAL CONDITIONS

1.0 DEFINITIONS AND TERMINOLOGY

- A. The following language shall be added at the beginning of the definition entitled “Contract Documents” in the General Conditions (1.01.A.13).

“The Invitation to Bid, Instructions to Bidders”

- B. 1.01.A.18, Add the words “or plans” after the word “drawings in the first line of the definition entitled “Drawings” in the General Conditions.

- C. 1.01.A.38, Delete the definition of Specifications in the General Conditions in its entirety and add the following in its place:

“Sections included under Division 1 through Division 16 of the Contract Documents”

- D. 1.01.A.40 The definition of Substantial Completion shall be deleted in the General Conditions in its entirety and add the following in its place:

Substantial completion shall mean either that the work required by the Contract has been completed except for work having a contract price of less than one percent of the then adjusted total contract price, or substantially all of the work has been completed and opened to Owner’s use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the Contract.

- E. The following new definitions shall be added at the end of Article 1 of the General Conditions:

Conditions of the Contract–The combined General Conditions and Supplementary Conditions.

Site – The specific area adjacent to and including the area upon which the construction work is performed.

2.0 PRELIMINARY MATTERS

- A. Delete paragraph 2.03A in its entirety and insert in its place:

2.03. A: Contract time will commence on the date specified in the Notice to Proceed.

3.0 DOCUMENTS: INTENT, REQUIREMENTS AND REUSE

Four paragraphs shall be added immediately after paragraph 3.01.E of the General Conditions which is to read as follows:

3.01.F. Each and every provision of law and clause required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

3.01.G. Contract Documents shall forthwith be physically amended to make such insertion.

3.01.H. In case of any discrepancy between these Conditions of the Contract and any Federal Government provisions, the Federal Government provision shall prevail.

3.01.I. In case of any discrepancy between these between these Conditions of the Contract and any Commonwealth of Massachusetts provisions, the Commonwealth of Massachusetts provision shall prevail.

3.01.J In the event of conflicts, inconsistencies or discrepancies among the Contract Documents, to the extent applicable, the better quality or greater quantity of work shall be provided without change to the Contract Price. In the event of such conflicts, inconsistencies or discrepancies which do not relate to the quality or quantity of work, the Contractor shall request clarifications or interpretations from the Engineer as provided in Article 10.

5.0 AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

A. A new paragraph shall be added immediately after paragraph 5.01.C of the General Conditions which is to read as follows:

D. If all lands and rights-of-way are not obtained as herein contemplated before construction begins, the Contractor shall begin the work upon such land and rights-of-way as the Owner has previously acquired and no claim for damages whatsoever will be allowed by reason of the delay in obtaining the remaining lands and rights-of-way. Should the Owner be prevented or enjoined from proceeding with the work, or from authorizing its prosecution, either before or after the commencement, by reason of any litigation, or by reason of its inability to procure any lands or rights-of-way for work, Contractor shall not be entitled to make or assert claim for the damage by reason of said delay, or to withdraw from the Agreement except by consent of the Owner. Time for

completion of the work will be extended as provided in Article 11, to such time as the Owner determines will compensate for the time lost by such delay.

- B. A new paragraph shall be added immediately after paragraph 5.03.B of the General Conditions which is to read as follows (if borings performed):

5.03.C. The Engineer has relied upon the data obtained from subsurface investigations made at the site in the form of test borings and probes. Such data is in the form of logs which are included in the Section 00220 and soil samples which may be examined at the Engineer's office during regular business hours. The locations of the test borings and probes are indicated on the Drawings. Such logs and samples are not part of the Contract Documents.

- C. Two new paragraphs shall be added immediately after paragraph 5.05.E of the General Conditions which is to read as follows:

5.05.F. Information on Drawings and any statements of the Contract Documents referring to the conditions under which the work is to be performed or the existence of utilities or other underground structures are not guaranteed to be correct or to be complete representation of all existing data with reference to conditions affecting the work. Efforts have been made however, to make this information complete and accurate on the basis of all data and information which could be procured by Engineer. If, in the opinion of Engineer, permanent relocation of a utility not otherwise provided for, is required, he shall direct the Contractor, in writing, to perform the work. Work, so directed, will be paid as provided in Article 11 of the General Conditions.

5.05.G. Adjustments resulting from subsurface or latent physical conditions will be in accordance with Massachusetts General Law, Chapter 30, Section 39N.

6.0 BONDS AND INSURANCE CONTRACTOR'S (AND SUBCONTRACTOR'S) PUBLIC LIABILITY, PROPERTY DAMAGE AND VEHICLE LIABILITY INSURANCE

The following shall be added to 6.0.

- A. The liability limits for the insurance required by the General Conditions shall provide coverage for not less than the following amounts or greater where required by law:

The Contractor shall purchase and maintain such insurance as will protect him for claims set forth herein which may arise out of or result from the Contractor's operations be by himself or by any subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them are liable.

1. Claims under workman's compensation, disability benefit and other similar employee benefit and other similar employee benefit acts;

2. Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees;
3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;
4. Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person; and
5. Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

B. The required insurance shall be written for not less than the following limits of liability, or as required by law, whichever is greater.

The work shall be entirely at the contractor's risk until the same is fully completed and accepted, and he will be held liable to the amount of the City's interest in the same as shown by payments account.

The contractor shall, during the progress of the work, maintain insurance on all work included in the contract until the final or conditional acceptance of the work. **The City shall be named as an additional insured on all insurance.** Failure to provide and continue in force such insurance as specified shall be deemed a material breach of the contract and shall operate as an immediate termination thereof.

A contractor shall not commence work under any contract until he has obtained all insurance required, nor shall the contractor allow any subcontractor to commence work on a sub-contract until all similar insurance required has been obtained.

1. Workmen's Compensation Insurance

The contractor will maintain, during the life of the contract, the statutory Worker's Compensation and Employer's Liability for all employees to be engaged in work on the project under the contract and in case any such work is sublet. The contract shall require the sub-contractor similarly to provide Worker's Compensation and Employer's Liability Insurance for all employees engaged in the project.

2. Automobile Bodily Injury and Property Damage

There shall be provided insurance for not less than \$1,000,000 for injuries, including wrongful death, to any one person, \$3,000,000 aggregate. Any one accident shall be covered to a limit of \$1,000,000 bodily injury each

occurrence, \$3,000,000 aggregate. There shall be property damage insurance provided to the amount of \$1,000,000 on account of any one accident and included owned, hired and non-owned automobiles.

3. Comprehensive General Liability

The contractor shall purchase and maintain such insurance as required to protect the owner's interest for the duration of the contract and until acceptance of the work.

Comprehensive General Liability Coverage covering bodily injury and property damage with limits of \$1,000,000 each occurrence, \$3,000,000 aggregate, shall include coverage for premises, operations XCU included, products completed operations, contractual insurance, brand form property damage, independent contractor's personal injury coverages.

4. Property Coverage

For materials and supplies being transported by the contractor.

5. Umbrella Liability

\$3,000,000/occurrence, \$3,000,000 aggregate.

C. The Contractor shall procure and maintain Owner's Protective Liability Insurance as herein specified.

6. In addition to the Owner the Engineer shall be named as an inseree under the Owner's Protective Liability Insurance.

7. Said policy shall provide that the coverage afforded thereby, shall be primary coverage to the full limit of liability state in the declarations, and if said Owner and its officers, agents and employees or the Engineer have other insurance against the loss covered by said policy, that other insurance shall be excess insurance only.

8. The original and one certified copy of the policy specified shall be forwarded to the Engineer for the Owner prior to commencement of any work.

9. The limits of Owner's Protective Liability Insurance shall be not less than One Million Dollars (\$1,000,000) on account of any one accident and Three Million Dollars (\$3,000,000) on account of all accidents.

D. The Contractor's and Subcontractor's insurance shall provide adequate protection against the following special hazards:

1. Blasting or explosion

2. Collapse of trench walls and underground damage
 3. Use of all equipment and tools
- E. The Contractor shall not commence work under this Contract until he has obtained all insurance required hereunder and such insurance has been approved by the Owner, nor shall the Contractor allow any subcontractor to commence work on his subcontract until all insurance required of subcontractor has been so obtained and approved. Approval of insurance required under this article shall be kept in force during the life of the Contract.
1. Certificates in triplicate of all General Contractor's policies specified shall be filed with the Engineer for the Owner. Any certificates filed with the Engineer which shall be found to be incomplete or not according to form will be returned as unsatisfactory. Rejected certificates of insurance and copies of policies shall be corrected as necessary and resubmitted until approved.
- F. Each and every policy shall contain an endorsement stating that the Insurance Company will to, prior to completion of project or any policy expiration date shown on policy and certificate, whichever occurs first, terminate policy or change any coverage therein without first mailing by registered mail, written notice of such action at least fifteen (15) days prior to termination or change, to Owner at whose request policy and certificates are issued.
- G. Delete paragraph 6.05 of the General Conditions in its entirety.
- H. Delete paragraph 6.06 of the General Conditions in its entirety.
- I. Delete paragraph 6.07 of the General Conditions in its entirety.
- J. The following new paragraphs shall be added immediately after paragraph 6.07 of the General Conditions which is to read as follows:
- 6.08. The Contractor may purchase and maintain excess liability insurance in the umbrella form in order to satisfy the limits of liability required for the insurance to be purchased and maintained in accordance with the general conditions in the form of a certificate indicating the policy numbers and limits of liability of all underlying insurance. The umbrella liability insurance shall have a combined single limit of not less than \$3,000,000. Such insurance shall contain a provision that the coverage afforded will not be cancelled or materially changed until at least thirty days prior written notice has been given to Owner.
- 6.09. If the aggregate limits of liability indicated in the Contractor's insurance provided in accordance with above limits is not sufficient to cover all claims for damages arising from his operations under this contract and from any other work performed by him or if policies of insurance do not provide that the aggregate limits of liability for bodily injury and property damage apply to each

contract or project separately, Contractor shall have such policies amended so that the aggregate limits of liability required by this Contract will be available to cover all claims for damages due to operations under this Contract.

6.10 PROOF OF CARRIAGE OF INSURANCE

Policies shall contain a clause automatically extending date of expiration to coincide with any extended date of completion granted under the Contract.

6.11 OWNER'S PROTECTIVE LIABILITY INSURANCE

The Engineer shall be named as an insuree under the Owner's Protective Liability Insurance.

Said policy shall provide that the coverage afforded thereby shall provide that the coverage afforded thereby shall be primary coverage to the full limit of liability stated in the declarations, and if said Owner and its officers, agents and employees or the Engineer have other insurance against the loss covered by said policy, that other insurance shall be excess insurance only.

CONTRACTOR'S RESPONSIBILITIES

- A. The following new paragraphs shall be inserted immediately after paragraph 7.02.B of the General Conditions.
- C. This Agreement is subject to the applicable provisions of the Contract Work Hours and Safety Standards Act, Public Law 87-581, 87th Congress. No Contractor or subcontractor contracting for any part of the work shall require or permit any laborer or mechanic to be employed on the work in excess of eight hours in any calendar day or in excess of forty hours in any work week unless such laborer or mechanic receives compensation at a rate not less than one and one-half times his basic rate of pay for all hours worked in excess of eight hours in any calendar day or in excess of forty hours in such work week, as the case may be.
- D. Except as may be otherwise required by law, all claims and disputes pertaining to the classification of labor employed on the project under this Contract shall be decided by the Owner's governing body or other duly designated official.
- E. The Contractor shall employ only competent men to do the work and whenever the Owner shall notify Contractor, in writing, that any man on the work appears to be incompetent, unfaithful, disorderly, or otherwise unsatisfactory, such man shall be removed from the project and shall not again be employed on it except with the consent of the Owner.
- F. The Contractor and all subcontractors shall, insofar as practicable, give preference in the hiring of workers for the project to qualified local residents

with first preference being given to citizens of the United States who have served in the armed forces of the United States and have been honorably discharged therefrom or released from active duty therein.

G. The Contractor and all subcontractors shall pay to all laborers and mechanics employed for the construction covered by this contract the minimum rates of pay as determined by the Secretary of Labor in accordance with the Act of March 3, 1931, as amended, known as the Davis-Bacon Act (40 U.S.C. 276a through 276a-7). Furthermore, the Contractor and subcontractors shall adhere to the stipulations and provisions published by the Secretary of Health, Education, and Welfare in "Labor Standards (Federal Water Pollution Control Act)". The Wage Rate Schedule as prepared by the Secretary of Labor and the "Labor Standards" are part of this Contract and are included in Part II of these Supplementary Conditions.

H. The Contractor and all subcontractors shall comply with the Regulations of the Secretary of Labor made pursuant to the Anti-Kickback Act of June 30, 1940 (40 U.S.C. 276c) and all amendments or modifications thereto. The Contractor and all subcontractors shall furnish the Owner with weekly Statements of Compliance. In case of subcontracts, the Contractor shall cause appropriate provision to be inserted in all subcontracts for the work which he may let to insure compliance with said Anti-Kickback Act by all subcontractors subject thereto, and Contractor shall be responsible for the submission of all Statements of Compliance required by subcontractors by said Anti-Kickback Act except as the Secretary of Labor may specifically provide for reasonable limitations, variations, and exemptions from the requirements thereof. These Regulations are part of this Contract and are included in Part II of these Supplemental Conditions.

- B. Paragraph 7.06.A of the General Conditions shall be deleted in its entirety and insert the following in its place:

7.06.A The Contractor shall not employ any subcontractor, supplier or other person or organization, (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom Owner or Engineer may have reasonable objection. Acceptance of any subcontractor, other person or organization by the Owner shall not constitute a waiver of any right of Owner to reject defective work. The Contractor shall not be required to employ any subcontractor, other person or organization against whom the Contractor has reasonable objection.

- C. The following language shall be added at the end of paragraph 7.09 of the General Conditions:

7.09.B. Except as required otherwise by Massachusetts General Law Chapter 149, Section 44F.

The materials and supplies to be used in the work of this contract are exempt from the Sales and Use Tax of the Commonwealth of Massachusetts. The Contractor shall obtain the proper certificates, maintain the necessary records and otherwise comply with the requirements of Chapter 14 of the Acts of 1966 and any amendments thereto.

- F. The following language shall be added at the end of paragraph 7.12.G of the General Conditions:

7.12H. In the event of temporary suspension of the work, or during inclement weather, or whenever the Engineer may direct; the Contractor shall, and shall cause Subcontractors, to protect carefully the work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of work or materials shall have been damaged or injured by reason of failure on the part of the Contractor or any subcontractors to so protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.

- J. A new paragraph shall be added immediately after paragraph 7.19.E of the General Conditions which is to read as follow:

7.19.F The Contractor shall comply with all applicable provisions of Chapter 30, Section 39R of the Massachusetts General Laws regarding Contractor's records. This requirement primarily provides for the Contractor to maintain for at least six years after final payment books, records, and accounts in reasonable detail, available for examination. This requirement further provides for the Contractor to document and submit descriptions and reasons for any changes in record keeping methods, and to prepare and submit annual financial statements.

10.0 ENGINEER'S STATUS DURING CONSTRUCTION

A new paragraph shall be added immediately after paragraph 10.09 of the General Conditions which is to read as follows:

10.10 The Engineer's interpretations will be made in accordance with Massachusetts General Law Chapter 30, Section 39P which is included in Part II of the ADDITIONAL ARTICLES.

15.0 PAYMENTS TO CONTRACTORS AND COMPLETION

A new Paragraph 15.09 of the General Conditions shall be added after 15.08.

15.09 Progress Payments will be made in accordance with Massachusetts General Law, Chapter 30, Section 39G. Retainage shall be 5%, in accordance with M.G.L., Chapter 30, Section 39G.

15.10. If, after 60 days following submission of a monthly payment estimate for pipe and fitting items, the pipe and fittings for which payment is requested has not been successfully tested, the Owner may withhold up to 10% of the amount requested for such pipe and fitting items until the pipe has been so tested, however, in the case of a major (pipe diameter 24 inches or greater) pipe and fitting installation, sums retained by the Owner pursuant to this paragraph shall not exceed two percent (2%) of the costs of such pipe items. This retainage shall be in addition to any other retainage required by this Contract.

The Contractor shall make payments to subcontractors in accordance with Massachusetts General Law, Chapter 30, Section 39F which is included in ADDITIONAL ARTICLES.

15.11. If, on the basis of the Engineer's observation of the work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation – all as required by the Contract Documents, Engineer is satisfied that the work has been completed and the Contractor's other obligations under the Contract Documents have been fulfilled, the Engineer will indicate in writing his recommendation of payment and present the Application to the Owner for payment. Thereupon the Engineer will give written notice to the Owner and the Contractor that the work is acceptable subject to the provisions of paragraph 14.16. Otherwise, the Engineer will return the Application to the Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case the Contractor shall make the necessary corrections and resubmit the Application. If the Applications and accompanying documentation are appropriate as to form and substance, Owner shall in accordance with the applicable Massachusetts General Law, pay Contractor the amount recommended by Engineer.

15.12. Final payment will be reduced by excessive costs of plant inspection of pipe; the Contractor shall have no claim thereto. Excessive inspection costs are defined as the costs of inspection of that amount of pipe which exceeds 125 percent of the aggregate length of each type installed.

16.0 SUSPENSION OF WORK AND TERMINATION

Paragraph 16.01 of the General Conditions shall be deleted in its entirety and insert the following in its place:

16.01. The Owner may order, at any time and without cause, suspension of the work in accordance with Massachusetts General Law, Chapter 30, Section 39O.

17.0 DISPUTE AND RESOLUTION

Article 17 of the General Conditions shall be deleted in its entirety.

MISCELLANEOUS

A new paragraph shall be added immediately after paragraph 18.08 of the General Conditions which is to read as follows:

18.09. Both the address given in the Bid Form upon which this Agreement is founded, and the Contractor's office at or near the site of the work are hereby designated as places to either of which notices, letters, and other communications to the Contractor shall be certified, mailed, or delivered. The delivering at the above named place, or depositing in a postpaid wrapper directed to the first-named place, in any post office box regularly maintained by the post office department, if any notice, letter or other communication to the Contractor shall be deemed sufficient service thereof upon the Contractor: and the date of said service shall be the date of such delivery or mailing. The first-named address may be changed at any time by an instrument in writing, executed and acknowledged by the Contractor, and delivered to the Owner and shall be deemed to preclude or render inoperative the service of any notice, letter, or other communications upon the Contractor personally.

WAGE RATES

The following 4 new paragraphs shall be added immediately after paragraph 18.09 of the General Conditions:

18.10. The requirements and provisions of all applicable laws and any amendments thereof or additions thereto as to the employment of labor, and to the schedule of minimum wage rates established in compliance with laws shall be part of these Contract Documents. Copies of the wage schedule are included in Appendix A. If, after the Notice of Award, it becomes necessary to employ any person in a trade or occupation not classified in the wage determinations, such approved minimum rate shall be paid at not less than such rates as shall be determined by the officials administering the laws mentioned above. Such approved minimum rate shall be retroactive to the time of the initial employment of such person in such trade or occupation. The Contractor shall notify the Owner of his intention to employ persons in trades or occupations not classified in sufficient time for Owner to obtain approved rates for such trades or occupations.

- A. The schedules of wages referred to above are minimum rates only, and the Owner will not consider any claims for additional compensations made by the Contractor of any wage rate in excess of the applicable rate contained in these Contract Documents. All disputes in regard to the payment of wages in excess of these specified in the schedules shall be adjusted by Contractor.
- B. The said schedules of wages shall continue to be the minimum rates to be paid during the life of this Agreement and a legible copy of said schedules shall be kept posted in a conspicuous place at the site of the

work. Minimum Wage Rates as determined by the Commissioner of the Department of Labor and Industries, apply to this project. It is the responsibility of the Contractor, before bid opening, to request if necessary, any additional information on Minimum Wage Rates for those trades people who are not covered by this schedule of wage rates, but who may be employed for the proposed work under this Contract.

- C. State schedules of minimum wage rates are included in Appendix A. Where rates differ, the higher rates shall apply as a minimum for that trade.

PART 2 ADDITIONS TO GENERAL CONDITIONS

None this Contract

PART 3 STATE AND FEDERAL GOVERNMENT PROVISIONS

State and Federal Government Provisions are included in Appendix B and selected from those to which specific references have been made elsewhere in the Contract Documents. Each and every other provision of law or clause required by law to be inserted in this Contract shall be deemed to be also inserted in herein.

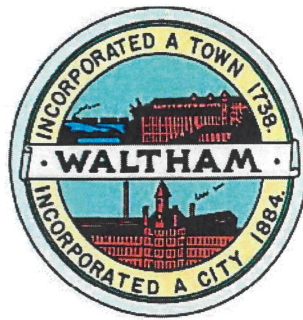
- 1.0. COMMONWEALTH OF MASSACHUSETTS AND FEDERAL PROVISIONS
- 1.1. The Owner and Contractor agree that the following Commonwealth of Massachusetts and Federal Provisions apply to the Work to be performed under this Contract and that these provisions of this Contract and that these provisions supersede any conflicting provisions of this Contract.
- 1.2. Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program.
- 1.3. Massachusetts General Laws
 - 1.3.1. Chapter 30, Section 39F
 - 1.3.2. Chapter 30, Section 39G
 - 1.3.3. Chapter 30, Section 39M
 - 1.3.4. Chapter 30, Section 39N
 - 1.3.5. Chapter 30, Section 39O
 - 1.3.6. Chapter 30, Section 39P
 - 1.3.7. Chapter 30, Section 39R
 - 1.3.8. Acts of 1983 Chapter 353
- 1.4. All documents in section 00500 – Agreement and additional Contract Documents

END OF SECTION

**CONTRACT AND SPECIFICATIONS
FOR
CEDARWOOD WATER STORAGE TANK
REHABILITATION PROJECT**

JANUARY 2024

Prepared For:



**CITY OF WALTHAM - WATER DIVISION
165 LEXINGTON STREET
WALTHAM, MA 02452**

Prepared By:



 **H₂Olson Engineering, Inc.**
DRINKING WATER PROFESSIONALS

DIVISION 1 – GENERAL REQUIREMENTS

01010	Summary of Work
01024	Measurement and Payment
01040	Project Coordination
01046	Control of Work
01095	Reference Standards and Definitions
01170	Special Provisions
01200	Project Meetings
01300	Submittals
01311	Construction Progress Schedules
01350	Health and Safety Plan
01400	Quality Assurance
01500	Temporary Facilities
01610	Delivery, Storage, and Handling
01700	Contract Closeout
01710	Cleaning Up

SECTION 01010

SUMMARY OF WORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 LOCATION OF WORK

- A. The work to be performed under this Contract shall be conducted at the site of the Cedarwood Tank, located in the City of Waltham, Massachusetts.
- B. The Work includes but is not necessarily limited to the following major items to be performed on the 2.0 MG steel standpipe tank:
 - 1. Furnishing all materials, labor, and equipment for tank repairs as required and where pilasters were previously removed, surface preparation, and the application of new interior and exterior coating systems on all tank surfaces including the removal of security system conduits.
 - 2. Installation and use of protection systems at the site to prevent migration of debris associated with the work to be performed as detailed in section 13210.
 - 3. Installation of hydro-dynamic tank mixing system, including HDPE pipe, variable orifice inlet nozzles and outlet check valves.
 - 4. Installation of new storage tank appurtenances including an exterior ladder, secondary roof hatch, drain valve, and overflow screen and flapper valve.
 - 5. Installation of storage tank safety appurtenances including extended roof handrails.
 - 6. Performing all excavations and backfilling of areas to be excavated including furnishing all backfill materials and surface restoration.
 - 7. Furnishing, installation and maintenance of all traffic control and safety measures during the construction period, including signs, barricades, detours, maintenance of safe vehicular and pedestrian access to abutting properties, and assuring an uninterrupted supply of utility services to all abutters within the project area, at all times.

8. Water quality sample collection and analysis at a Massachusetts State Certified laboratory for Chlorine, Heterotrophic Plate Count, Coliform Bacteria and VOC's.
 9. Clearing and grubbing areas around the tank.
 10. Coordination of all construction activities with the appropriate local and State authorities, and utility companies.
 11. Attending a pre-construction conference and the required job progress meetings.
 12. Submission of all required shop drawings, in a timely manner, to the Engineer, for review.
- C. For the Contractor to perform this work, the Cedarwood water storage tank will be taken offline and drained on May 22, 2024.
- D. The work shall also conform to such additional Drawings and addenda to these Specifications and Drawings as may be published or exhibited prior to the opening of bid proposals and to such Drawings in explanation of details, or as may be furnished by the Engineer from time to time during the construction.
- E. Work and materials which are necessary in the construction, but which are not specifically referred to in the Specifications or shown on the Drawings, but implied by the contract, shall be furnished by the Contractor at his own cost and expense, and shall be such as will correspond with the general character of the work, as may be determined by the Engineer, whose decisions as to the necessity for and character of such work and materials shall be final and conclusive. It is the intent of these Specifications to produce a complete, finished job, whether shown in every detail or not.

1.3 CONTRACTOR'S USE OF PREMISES

- A. Contractor shall limit the use of the premises for their Work and for storage to allow for:
1. Property Owner occupancy, including Easements.
- B. Contractor shall assume full responsibility for security of all their and their subcontractors' materials and equipment stored on the site.
- C. If directed by the Owner or Engineer, move any stored items which interfere with operations of Owner or other contractors.
- D. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

1.4 PROPERTY OWNER OCCUPANCY

- A. Contractor shall not limit the use or access of the premises by the Owner and reasonable notification will be made by each party to inform the other if the site will be unavailable for any period of time.

1.5 UTILITIES

- A. The utilities shown on the plans have been located primarily from information furnished by others and are considered approximate both as to size and location. It shall be the Contractor's responsibility to locate all existing utilities and to protect same from damage or harm. All utilities interfered with or damaged shall be properly restored, at the expense of the Contractor, to the satisfaction of the Owner and Engineer.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01010

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SECTION 01024

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Under the price specified to be paid for each item, the Contractor shall furnish all materials and equipment, furnish all labor and plant and perform all operations to complete all work as indicated and specified. Provide all supervision, overhead items, bond and permit costs, protection and precautions and all other costs incidental to the construction work, complete, and as specified, are also included.
- B. A complete, finished, working job, as intended by the general nature of these Specifications, shall be produced whether or not any particular wording or direction is omitted or inadvertently not clearly stated.
- C. Measurement for payment shall be by the Engineer, except where noted elsewhere in this Specification. Measurement for payment for lump sum items shall be on the basis of percentage of work complete and in place, as determined by the Engineer.
- D. Each unit or lump sum price stated in the Bid shall constitute full compensation as herein specified for each item of work completed in accordance with the Drawings and Specifications.
- E. Unit prices submitted for various items of work will be utilized for determining prices of any additional work necessary during construction.
- F. The prices for those items which involve excavation shall include compensation for disposal of surplus excavated material, handling of water, and any required shoring or bracing for compliance with OSHA regulations.
- G. Unit prices submitted for various items of work will be utilized for determining prices of any additional work necessary during construction.
- H. Police details shall be paid for directly by the Contractor and reimbursed by the Owner.
- I. The Owner reserves the right to remove select bid items and to increase or decrease the unit quantity of bid items. The successful bidder is made aware that the unit price so stated on the bid form constitutes full compensation for that item, regardless of any increase or decrease in the unit quantity of that bid item. There is no guarantee of any minimum or maximum quantity for any bid item. Renegotiation of bid prices is solely at the discretion of the Owner.
- J. In accordance with Chapter 150 of the Acts of 2013 (An Act Relative to Price Adjustments for Certain Materials in Construction Projects), specifically Section 38A, of Massachusetts General Laws Chapter 30, the following materials will be eligible for price adjustments in accordance with Appendix C and applicable Specification Sections: fuel (both diesel and gasoline); liquid asphalt; and, portland cement (contained in cast-in-place concrete). The

noted material price adjustments are applicable on a monthly basis only when the monthly cost change in base prices exceeds +/- 5%.

1.2 ITEM DESCRIPTIONS

A. Item 1: Mobilization/Demobilization

1. Under the unit price for Item 1, the Contractor shall provide all labor, equipment, materials, and incidentals required to mobilize to the project site and demobilize when work is complete.
2. Payment or partial payments for Item 1 will be made upon completion of mobilization and upon completion of demobilization.

B. Items 2A and 2B: Exterior/Interior Tank Coating Systems

1. Under the unit price for Item 2A and 2B, the Contractor shall provide all labor, equipment, materials, and incidentals required for blast cleaning, paint removal and disposal, containment, surface preparation, and the spot-cleaning and painting of the exterior and interior surfaces of the rehabilitated 2.0-million-gallon steel standpipe tank. Work shall include performing any incidental remedial work required for the tank wall and dome including the removal of efflorescence and minor patching to provide a sound surface for the application of a water-resistant coating. Work shall include the application of a two-coat architectural coating system to the tank dome and exposed wall. Work shall also include the chlorinating and disinfection of the water storage tank in accordance with AWWA C652, as well as all required sampling and testing.
2. Payment for the exterior coating of the storage tank will be made under Item 2A. Payment for the interior coating of the storage tank will be made under Item 2B. For each item, payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

C. Item 3: Steel Tank Pit Repair

1. Under the unit price for Item 3, the Contractor shall provide all labor, equipment, materials, and incidentals required to repair tank pitting on the tank. Work to include the inspection and evaluation, and complete repair of each area of pitting identified.
2. Payment for the steel tank pit repair will be made for each pit filling repair completed under Item 3. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

D. Item 4A and 4B: Seal Concrete Foundation and Steel Tank Roof Seams

1. Under the unit price for Item 4A, the Contractor shall provide all labor, equipment, materials, and incidentals required to seal the tank foundation. Under the unit price for Item 4B, the Contractor shall provide all labor, equipment, materials, and incidentals required to seal the roof seams. Item 4A includes surface preparation,

excavation of ring wall to a depth of 6-inches below grade, application of an elastomeric sealant to the exposed concrete. Item 4B includes surface preparation and application of an elastomeric sealant to all unwelded interior roof seams.

2. Payment for sealing the foundation and roof seams will be made for each tank completed under Item 4A and 4B. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

E. Item 5: Grout Concrete Foundation

1. Under the unit price for Item 5, the Contractor shall provide all labor, equipment, materials, and incidentals required to grout the tank ring wall foundation. This item includes the removal of existing grout and application of grout to the exposed tank ring wall foundation.
2. Payment for grouting the concrete foundation will be made for each tank completed under Item 5. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

F. Item 6: Tank Mixing System

1. Under the unit price for Item 6, the Contractor shall provide all labor, equipment, materials, and incidentals required to furnish and install a hydro-dynamic mixing system including HDPE pipe, all fittings, bends, reducers and tees, variable orifice inlet nozzles, outlet check valves, and miscellaneous steel work required to provide a complete system. This item includes the mixing system design including pipe supports and preparation of shop drawings.
2. Payment for furnishing and installing a tank mixing system will be made for each system completed under Item 6. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

G. Item 7: Exterior OSHA-compliant Ladder

1. Under the unit price for Item 7, the Contractor shall provide all labor, equipment, materials, and incidentals required to remove and replace the existing exterior ladder with a new OSHA-complaint ladder, safety cages, hinged lockable gate at bottom of ladder, and all appurtenances and incidentals. The work includes removal of the existing ladder system.
2. Payment for the removal and replacement of the exterior ladder will be made for each ladder completed under Item 7. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

H. Item 8: Overflow Pipe Upgrades

1. Under the unit price for Item 8, the Contractor shall provide all labor, equipment, materials, and incidentals required to modify the overflow pipe discharge including piping modifications, furnish and install a screen and duckbill check valve on the existing overflow pipe, replacement of 12x8 reducer on the overflow drain.
2. Payment for overflow pipe upgrades will be made for completed upgrades under Item 8. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

I. Item 9: Roof Handrail and Walkway System

1. Under the unit price for Item 9, the Contractor shall provide all labor, equipment, materials, and incidentals required to install a new roof handrail and walkway system. This item includes additional safety handrails on the roof, an intermediate rail, toeboards, a swing gate at the junction of the access ladder and non-slip walkway system.
2. Payment for furnishing and installing a roof handrail system will be made for each system completed under Item 9. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

J. Item 10: Valve Vault Access Hatch Replacement

1. Under the unit price for Item 10, the Contractor shall provide all labor, equipment, materials, and incidentals required to remove and replace the existing access hatch at the valve vault associated with the tank.
2. Payment for the removal and replacement of the access hatch will be made for each valve vault hatch completed under Item 10. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

K. Item 11: Pressure/Level Transmitter in Valve Vault

1. Under the unit price for Item 11, the Contractor shall provide all labor, equipment, materials, and incidentals required to furnish and install a pressure transmitter for tank level measurement. The work includes pressure transmitter, instrumentation piping, signal wiring, conduit, integration and all other incidental work to provide complete functional tank level measurement.
2. Payment for the pressure/level transmitter shall be made for each tank completed under Item 11. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

L. Item 12: Tank Sample Tap and Enclosure

1. Under the unit price for Item 12, the Contractor shall provide all labor, equipment, materials, and incidentals required to furnish and install a new sample tap system on the

exterior tank wall. The work includes tapping the steel tank, sample piping, valves, pressure indicating gage and appurtenances, furnishing and mounting insulated enclosure 120V power and duplex receptacle, and related conduit, wiring and incidental work.

2. Payment for the tank sample tap system will be made for each completed under Item 12. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

M. Item 13: Access Drive Erosion Control Matting

1. Under the unit price for Item 13, the Contractor shall provide all labor, equipment, materials, and incidentals required to furnish and install a drivable erosion control matting system along the access drive to the Tank. Work includes all excavation, backfill, subsurface preparation and grading, gravel transitions, flexible concrete block erosion control matting system and all incidental work.
2. Payment for the access drive erosion control matting will be made for each square foot (SF) of matting completed under Item 13. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

N. Item 14: Temporary Relocate and Reset Antennas

1. Under the unit price for Item 14, the Contractor shall provide all labor, equipment, materials, and incidentals required to remove two (2) existing communication antennas from the tank, temporarily relocate the antennas and reset the antennas on the rehabilitated tank. The work includes close coordination with the Owner and Engineer to maintain fully functional communications for both antennas for the duration of the project. Temporary power, cable, mounting and all other work is included in this item.
2. Payment for Work completed under Bid Item 14 must be first approved by the Owner and shall be the actual amount as agreed to by the Owner and Contractor prior to work being completed. Payments shall be made as described for such Work as a percentage of completion of such work.

O. Item 15: Miscellaneous Items

1. Under the unit price for Item 15, the Contractor shall provide all labor, equipment, materials, and incidentals required to provide miscellaneous items and work not described in other bid items. This item includes general conditions, project management, Division 01 items not included in other bid items, site work not included in other items, replacement of barbed wire on perimeter fence, erosion controls and construction entrance, restoration of site and all other work shown on Drawings and described in Specifications not included in other bid items.
2. Payment for work completed under Bid Item 15 will be made as a percentage of completion of such work. Payment will also be considered full compensation for furnishing all labor, equipment, materials, and services required or incidental for the satisfactory completion of the work.

P. Item 16: Additional Repairs

1. This pay item shall be used for work completed at the direction of the Engineer for additional repairs not included in items 1 through 15, inclusive, and item 17 and in accordance with these specifications. Any amount remaining in this item at the end of the contract will be kept by the Owner.
2. Payment for Work completed under Bid Item 16 must be first approved by the Engineer and Owner and shall be the actual amount as agreed to by the Engineer and Owner and Contractor prior to work being completed. Payments shall be made as described for such Work as a percentage of completion of such work.

Q. Item 17: Police Details

1. Payment shall be made at the stated allowance in the Bid Form. The police department will bill the Contractor directly and the Contractor shall pay the police department bills within a ten-day working period for uniform police officers provided on the job site. The billing shall include a weekly statement outlining the days worked, hours worked, location of the work and rate for all officers providing service during that billing period. All bills must be signed by the Chief of Police.
2. The Contractor will be paid by Owner for bills paid to the police department. The Contractor shall submit paid bills from the police department, stamped and signed as paid, to the Engineer, with the Contractor's Application for Payment.
3. Uniformed officers required for purposes other than public safety and/or control of traffic shall not be eligible for payment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01024

SECTION 01040

PROJECT COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section specifies administrative and supervisory requirements necessary for Project coordination including, but not necessarily limited to:
 - 1. Coordination
 - 2. Administrative and supervisory personnel
 - 3. General installation provisions
 - 4. Cleaning and protection
- B. Progress meetings and preconstruction conferences are included in Section 01200 – “Project Meetings”.
- C. Requirements for the Contractor's Construction Schedule are included in Section 01300 – “Submittals”.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION PROVISIONS

- A. Inspection of Conditions: Inspect the conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner, and at no additional cost to the Owner.
- B. Manufacturer's Written Instructions: Comply with manufacturer's written installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in the Contract Documents.
- C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items, and at no additional cost to the

Owner.

- D. Provide attachment and connection devices and methods for securing work. Secure work true to line and level. Allow for expansion and utility movement.
- E. Recheck measurements and dimensions before starting installation or erection.
- F. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material to prevent deterioration.
- G. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

3.2 CLEANING AND PROTECTION

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Install protective covering to ensure protection from damage or deterioration.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period.
- C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:
 - 1. Excessive static or dynamic loading
 - 2. Excessive internal or external pressures
 - 3. Excessively high or low temperatures
 - 4. Air contamination or pollution
 - 5. Water or ice
 - 6. Solvents
 - 7. Chemicals
 - 8. Heavy traffic
 - 9. Misalignment
 - 10. Unprotected storage

11. Improper shipping or handling
12. Theft
13. Vandalism

END OF SECTION 01040

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SECTION 01046
CONTROL OF WORK

PART 1 - GENERAL

1.1 EQUIPMENT

- A. Furnish equipment which will be efficient, appropriate, and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the Contract Time. If at any time such equipment appears to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, they may order the Contractor to increase the efficiency, change the character or increase the plant equipment and the Contractor shall conform to such order. Failure of the Engineer to give such an order shall in no way relieve the Contractor of their obligations to secure the quality of the work and rate of progress required.

1.2 OCCUPYING PRIVATE LAND

- A. The Contractor shall not (except after written consent from the proper parties) enter or occupy with men, tools, materials, or equipment any land outside the rights of way or property of the Owner.

1.3 HAULING, HANDLING, AND STORAGE OF MATERIALS

- A. The Contractor shall, at their own expense, handle and haul all materials furnished by them and shall remove any and all of their surplus materials at the completion of the work. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by them that are liable to injury and shall be responsible for any loss or damage to any equipment or materials by theft, breakage, or otherwise. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance, even though partial payments have been made under the Contract.

1.4 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

- A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. The Contractor is required to comply with all provisions of DigSafe (www.digsafe.com). Any damage resulting from the Contractor's operations shall be repaired by them at their expense.
- B. Assistance will be given to the Contractor in determining the location of existing services. The Contractor, however, shall bear full responsibility for obtaining all

locations of underground structures and utilities (including, but not limited to existing water services, drain lines, sewers). All costs or charges resulting from damage thereto shall be paid by the Contractor.

- C. Protection and temporary removal and replacement of existing utilities and structures as described in this section shall be a part of the work under the Contract and all costs in connection therewith shall be included in the respective Bid Item for associated work in the Bid Form.
- D. The Contractor shall comply with the requirements of the Commonwealth of Massachusetts Statute - Chapter 82, Section 40, for excavations in public and private property.
- E. The Contractor shall notify Massachusetts Dig Safe (1-888-344-7233) at least 72 hours before digging, trenching, blasting, demolishing, boring, backfilling, grading, landscaping or other earth moving operations in any public ways, rights of way and easements.
- F. The Contractor shall notify all utility companies at least 72 hours (excluding Saturdays, Sundays, and legal holidays) before excavating in any public way.
- G. If, in the opinion of the Engineer, permanent relocation of a utility owned by the City is required, which is not shown on the Plans or the Specifications, they may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for as extra work under Articles of the General Conditions. If relocation of a privately-owned utility is required, the City will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the City and utility and shall have no claim for delay due to such relocation. The Contractor shall notify public utility companies, in writing, at least 72 hours (excluding Saturdays, Sundays, and legal holidays) before excavating in any public way.

1.5 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from injury in any way. No placing of heavy loads on it shall be allowed, and all portions injured shall be reconstructed by the Contractor at their own expense.
- B. All structures shall be protected in a manner approved by the Engineer. All such damaged portions of the work shall be completely repaired and made good by the Contractor, at their own expense, and to the satisfaction of the Engineer.
- C. If, in the final inspection of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship, without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction, and other work undertaken herein, for at least the guarantee period described in the Contract Documents.

- D. The Contractor shall take all necessary precautions to prevent damage to any work during and after construction, and until such work is accepted and taken over by the Owner.

1.6 CARE AND PROTECTION OF PROPERTY AND SURVEY MONUMENTS

- A. The Contractor shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property, by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at their expense, to a condition similar or equal to that existing before the damage was done, or they shall make good the damage in another manner acceptable to the Engineer.
- B. Along the location of this work, all fences, walks, bushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner. Fences and other features removed by the Contractor shall be replaced as soon as conditions permit. All grass areas beyond the limits of construction, which have been damaged by the Contractor, shall be graded and seeded.
- C. Trees close to the work shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of their operations, but in no case shall any trees be cut or removed without prior notification of the City or other person in charge. All injuries to bark, trunk, limbs, and roots of trees shall be repaired by dressing, cutting, and painting according to approved methods using only approved tools and materials.
- D. The protection, removal, and replacement of existing physical features along the line of work shall be a part of the work under the Contract, and all costs in connection therewith shall be included in the Bid Proposal. The Contractor is responsible for protecting and, if required, re-setting survey monuments (bounds). If a bound is in the way of required excavation, the Contractor will notify the Engineer with as much notice as possible prior to performing excavation near the bound.

1.7 REJECTED MATERIALS AND DEFECTIVE WORK

- A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the Specifications shall forthwith be removed from the work by the Contractor and shall not be made use of elsewhere in the work. Any errors, defects, or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor, and in a manner satisfactory to the Engineer. The Contractor shall reimburse the Owner for any expenses, losses, or damages incurred as a consequence of any defect, error, omission, or act of the Contractor or their employees, as determined by the Engineer, occurring previous to the final payment.

1.8 COORDINATION WITH LOCAL AGENCIES

- A. The Contractor shall attend a Pre-Construction Meeting approximately one week prior to the start of work. The contractor will provide the proposed schedule at that time (see Submittals, Section 01300).
- B. The Contractor shall attend a Site Meeting with the Engineer after installation of environmental protection measures (see Section 02020 and stabilized construction entrance on Drawings) to review the placement of the protection measures.
- C. The Engineer will have the authority to reject any work or materials that do not constitute approval by the Owner and shall not relieve the Contractor of their obligations to perform the work in accordance with the Plans and Specifications.
- D. Protection and temporary removal and replacement of existing utilities and structures as described in this Section and elsewhere in the Contract Documents shall be a part of the work under the Contract and all costs in connection therewith shall be included in the Total Price Bid in the Bid Form.
- E. Coordinate with the Owner and Engineer to provide temporary relocation of communication equipment and maintain functionality prior to construction of tank rehabilitation work.

1.9 COOPERATION WITHIN THIS CONTRACT

- A. All firms or persons authorized to perform any work under this Contract shall cooperate with the General Contractor and their Subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.
- B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

1.10 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

- A. During the course of the work, the Contractor shall keep the site of operations in as clean and neat a condition as is possible. Contractor shall dispose of all residue resulting from the construction work and, at the conclusion of the work, they shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and shall leave the entire site of the work in a neat and orderly condition.
- B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and their subcontractors shall comply with all applicable Federal, State and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

- C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by them, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at their own expense and restore the area impacted.
- D. Outdoor burning of rubbish and waste material on the site will not be permitted.
- E. Disposal of volatile fluid wastes (such as mineral spirits, oil, gasoline, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.
- F. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01046

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SECTION 01095

REFERENCE STANDARDS AND DEFINITIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1, Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. Indicated: The term “indicated” refers to graphic representations, notes, or schedules on the Drawings, or other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.
- C. Directed: Terms such as “directed,” “requested,” “authorized,” “selected,” “approved,” “required,” and “permitted” mean directed by the Engineer, requested by the Engineer, and similar phrases.
- D. Approve: The term “approved,” when used in conjunction with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Engineer's duties and responsibilities as stated in the Conditions of the Contract.
- E. Regulation: The term “regulations” includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the work.
- F. Furnish: The term “furnish” means supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. Install: The term “install” describes operations at the project site, including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. Replace: The term “replace” means dismantle, remove, and dispose of existing equipment and materials and furnish and install new specified item.
- I. Provide: The term “provide” means to furnish and install, complete and ready for the intended use.
- J. Experienced: The term “experienced,” when used with the term Installer, means having a minimum of five previous projects similar in size and scope to this project,

being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.

- K Trades: Using terms such as “carpentry” is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such a carpenter. It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
- L “Project Site” is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing other work as part of the project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the project is to be built.
- K Testing Agencies: A “testing agency” is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents.
- C. Conflicting Requirements: Where compliance with two or more standards is specified, and where the standards may establish different or conflicting requirements for minimum quantities or quality levels, refer requirements that are different, but apparently equal, and uncertainties to the Engineer for a decision before proceeding.
- D. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Engineer for a decision before proceeding.
- E. Copies of Standards: Each entity engaged in construction on the project is required to be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. The following acronyms or abbreviations, as referenced in Contract Documents, are defined to mean the associated names. Names and addresses are subject to change and are believed, but not assured, to be accurate and up-to-date as of date of Contract Documents.

ACI	American Concrete Institute 38800 Country Club Drive Farmington Hills, Michigan 48331-3439 Telephone: (248) 848-3800
AI	Asphalt Institute 2696 Research Park Drive Lexington, Kentucky 40511-8480 Telephone: (859) 288-4960
ANSI	American National Standards Institute 25 West 43 rd Street 4th Floor New York, New York 10036 Telephone: (212) 642-4900
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive P.O. Box C700 West Conshohocken, Pennsylvania 19428-2959 Telephone: (877) 909-2786
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, Colorado 80235 Telephone: (303) 794-7711
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park Street, N.E. Vienna, Virginia 22180 Telephone: (703) 281-6613
NAPA	National Asphalt Pavement Association 6406 Ivy Lane Suite 350 Greenbelt, Maryland 20770-1441 Telephone: (888) 468-6499

NFPA National Fire Protection Association
One Batterymarch Park
Quincy, MA 02169-7471
Telephone: (617)-770-3000

WSC Water Systems Council
1101 30th Street NW
Suite 500
Washington, D.C. 20007
Telephone: (202) 625-4387

F. Federal Government Agencies: Names and titles of Federal Government standard-or specification-producing agencies are often abbreviated. The following acronyms or abbreviations referenced in the Contract Documents indicate names of standard-or specification-producing agencies of the Federal Government. Names and addresses are subject to change and are believed, but not assured, to be accurate and up-to-date as of the date of the Contract Documents.

CFR Code of Federal Regulations
(available from the Government Printing Office)
732 North Capitol Street, N.W.
Washington, D.C. 20401
Telephone: (202) 512-1800

(Material is usually first published in the "Federal Register")
EPA Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
Telephone: (202) 564-4700

NIST National Institute of Standards and Technology
(U.S. Department of Commerce)
100 Bureau Drive
Gaithersburg, Maryland 20899
Telephone: (301) 975-2000

OSHA Occupational Safety and Health Administration
(U.S. Department of Labor)
Government Printing Office
732 North Capitol Street, N.W.
Washington, D.C. 20401
Telephone: (202) 512-1800

1.4 GOVERNING REGULATIONS AND AUTHORITIES

A. The Engineer has contacted authorities having jurisdiction where necessary to obtain information to prepare Contract Documents. Contact authorities having jurisdiction directly for information and decisions regarding the work.

City of Waltham, Water & Sewer Division
Telephone: 781-314-3855

1.5 SUBMITTALS

- A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, warranties, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01095

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SECTION 01170

SPECIAL PROVISIONS

PART 1 - GENERAL

1.1 GENERAL OBLIGATIONS OF THE CONTRACTOR

- A. General obligations of the Contractor shall be as set forth in the Contract Documents. Unless special payment is specifically provided in the payment paragraphs of the specifications, all incidental work and expense in connection with the completion of work under the Contract will be considered a subsidiary obligation of the Contractor and all such costs shall be included in the appropriate items in the Bid Form in connection with which the costs are incurred.

1.2 SITE INVESTIGATION

- A. The Contractor shall satisfy themselves as to the conditions existing within the project area, the type of equipment required to perform the work, the character, quality, and quantity of the subsurface materials to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the Drawings and Specifications. Any failure of the Contractor to acquaint themselves with the available information will not relieve them from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusions or interpretations made by the Contractor on the basis of the information made available by the Owner.

1.3 CONSTRUCTION SCHEDULE

- A. For the Contractor to perform the work included in the contract, the Cedarwood water storage tank will be taken offline and drained during the months of June, July and August 2024.

1.4 CONTRACTOR'S EMERGENCY CONTACT AND RESPONSE REQUIREMENT

- A. The Contractor will be required to designate a contact person as well as an emergency response crew who can be notified by the City of Waltham during Contract related emergencies, 7 days a week, 24 hours a day throughout the length of this Contract.
- B. The name of the designated person, a daytime contact telephone number, an evening contact telephone number, and a portable cellular telephone number must be furnished to the City of Waltham at the pre-construction meeting. The Contractor must also provide a mobile cellular telephone that will remain at the construction site during the hours of construction.
- C. The contact person shall be required to respond to any City of Waltham notification in this regard within one hour of such notice by calling (781) 314-3855 during normal working hours or (781) 893-3700 after hours. Upon being advised by the City of

Waltham of the location and nature of the emergency, the Contractor will be required to provide an emergency coordinator or contact at the site within one hour of the initial notification and to mobilize the necessary response crew(s) and have them at the site of the emergency within two hours of the initial notification.

- D. The Contractor's failure to comply with the above notification and response requirements shall result in a one thousand dollar (\$1,000.00) fine for each failure to respond as indicated in 1.4.C. In addition, the Contractor shall be liable for any and all damages, liabilities, and costs which result from their failure to respond to any emergency within the designated time periods. The City of Waltham assumes no responsibility or costs for the Contractor's negligence in complying with these requirements. If the subject fine or other liabilities are not paid by the Contractor upon request, it shall be deducted from any payment(s) which may be due to the Contractor by the City of Waltham, solely at the discretion of the City of Waltham.
- E. The Contractor shall not use any City of Waltham personnel to fulfill these requirements.
- F. This requirement shall be considered an incidental part of the Contract, no matter how many times the Contractor is alerted during this Contract, and no payment will be made for any costs incurred or associated with the emergency contact and response requirements.

1.5 PUBLIC UTILITIES

- A. The Contractor shall comply with the requirements of the Commonwealth of Massachusetts Statute - Chapter 82A, for excavations in public and private property. Compliance shall include the following:
 - 1. The Contractor shall notify public utility companies in writing at least 72 hours (excluding Saturdays, Sundays, and legal holidays) but not more than 30 days before excavating in areas where underground utility plant (pipes, cables, manholes, etc) exist.
 - 2. The Contractor shall be responsible for providing the Utility Companies with a schedule of their activities in areas where the utilities exist.
 - 3. The Contractor shall immediately notify utility companies of any damage to their utilities resulting from construction operations.
 - 4. The express approval of the Owner shall be obtained before public water is used. Hydrants shall only be operated under the supervision of the Owner's personnel. The water is to be metered and Contractor shall install backflow prevention device. A meter must be attained from the Water Department. The Contractor will be responsible for all associated fees and charges for water use.
- B. The Contractor shall notify DIGSAFE at 1-800-344-7233 at least 72 hours before digging, trenching, blasting, demolishing, boring, backfilling, grading, landscaping, or other earth moving operations in any public ways, rights of way, and easements.

1.6 PERMITS

- A. The Contractor shall be required to obtain all necessary permits for proper execution of certain phases of the project. The Contractor shall fill out all forms and furnish all drawings required to obtain the permits. A copy of the approved permit shall be submitted to the Engineer. All fees associated with these permits shall be paid by the Contractor as part of the project. Work shall not commence on any phase of the work requiring a permit until the permit is obtained.
- B. The Contractor shall obtain the required street opening permit from the Department of Public Works for excavations within City streets or sidewalk area. There is a permit fee for each street opening. The permit fees shall be at the expense of the Contractor.

1.7 TRAFFIC AT STREET INTERSECTIONS

- A. The Contractor shall minimize interferences with the normal flow of traffic in and around the project area. The Contractor shall take all actions ordered by the Engineer to minimize the disruption of normal traffic flow.
- B. The Contractor shall note proximity to the local residential area and all efforts to minimize traffic disruptions shall be provided.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01170

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SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 COORDINATION WITH THE CITY

- A. As part of this Contract, the Contractor shall coordinate his activities with the City. In addition, the Contractor will give the City significant notice on any work that may be required to meet the contract schedule.

1.3 PRECONSTRUCTION CONFERENCE

- A. A pre-construction conference will be held between the Contractor, the Engineer, the Owner, and applicable agency representatives to review the Contractor's proposed methods of complying with the requirements of the Contract Documents.
- B. Contractor will be notified of the time, date, and place where the pre-construction conference will be held.
- C. A pre-construction meeting must be held which will include representatives of the Waltham Water and Sewer Division and the General Contractor.

1.4 PROGRESS MEETINGS WITH ENGINEER

- A. In addition to other regular project meetings for other purposes (as indicated elsewhere in the Contract Documents), hold general progress meetings twice each month with times coordinated with preparation of payment requests. Meeting dates shall be established by the Engineer. Require every entity then involved in the planning, coordination, or performance of work to be properly represented at each meeting. Include (when applicable) consultants, separate contractors (if any), principal subcontractors, suppliers/manufacturers/fabricators, governing authorities, insurers, special supervisory personnel, and others with an interest or expertise in the progress of the work. Review each entity's present and future needs including interface requirements, time, sequence, deliveries, access, site utilization, temporary facilities and services, hours of work, hazards and risks, housekeeping, submittals, change orders, and documentation of information for payment requests. Discuss whether each element of current work is ahead of schedule. Determine how behind-time work will be expedited, and secure commitments from the entities involved in doing so. Discuss whether schedule revisions are required to ensure that current work

and subsequent work will be completed within the Contract Time. Review everything of significance which could affect the progress of the work.

- B. Within 7 days after each progress meeting date, the Engineer will forward copies of the meeting minutes to the Contractor.
- C. Immediately following each progress meeting where revisions to the Progress Schedule/Critical Path Schedule have been made or recognized (regardless of whether agreed to by each entity represented), revise the Schedule. Reissue revised Schedule within 10 days after meeting. At intervals matching the preparation of payment requests, revise and reissue the Schedule to show actual progress of the work in relation to the latest revision of the Schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01200

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

- A. This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals: Shop Drawings, Product Data, Samples, Construction Photographs, and Construction Schedules. Additional general submission requirements are contained in the General Conditions. Detailed submittal requirements will be specified in the technical specifications sections.
- B. All submittals shall be clearly identified by reference to Specification Section, Paragraph, Drawing No., or Detail as applicable. Submittals shall be clear and legible and of sufficient size for sufficient presentation of data.

1.2 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

A. Shop Drawings

1. Shop drawings, as defined in the General Conditions, and as specified in individual work Sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the Work.
2. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.
3. The Contractor shall check all subcontractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.
4. All details on shop drawings submitted for approval shall clearly show the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.

5. Submittals for equipment specified under Division 2 shall include a listing of all installations where identical or similar equipment has been installed and been in operation for a period of at least 1 year.

B. Product Data

1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliance and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the Work.

C. Samples

1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the Work.

1.3 CONTRACTOR'S RESPONSIBILITIES

- A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:
 1. Field measurements
 2. Field construction criteria
 3. Catalog numbers and similar data
 4. Conformance with the Specifications
- B. Each shop drawing, sample, and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers, and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11-in x 17-in and smaller shall be bound together in an orderly fashion

and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the Resident Project Representative a copy of each submittal transmittal sheet for shop drawings, product data and samples at the time of submittal of said drawings, product data, and samples to the Engineer.

- C. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from their responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will have no responsibility, therefore.
- D. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased, or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.
- E. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

1.4 SUBMISSION REQUIREMENTS

- A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.
- B. Each submittal, appropriately coded, will be returned within 30 working days following receipt of submittal by the Engineer.
- C. Number of submittals required:
 - 1. Shop Drawings as defined in Paragraph 1.2 A: 6 copies.
 - 2. Product Data as defined in Paragraph 1.2 B: 6 copies.
 - 3. Samples: Submit the number stated in the respective Specification Sections.
- D. Submittals shall contain:
 - 1. The date of submission and the dates of any previous submissions.
 - 2. The Project title and number.
 - 3. Contractor identification.
 - 4. The names of:
 - a. Contractor
 - b. Supplier

c. Manufacturer

5. Identification of the product, with the specification section number, page, and paragraph(s).
6. Field dimensions, clearly identified as such.
7. Relation to adjacent or critical features of the Work or materials.
8. Applicable standards, such as ASTM or Federal Specification numbers.
9. Identification of deviations from Contract Documents.
10. Identification of revisions on resubmittals.
11. An 8-in x 3-in blank space for Contractor and Engineer stamps.

1.5 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

- A. The review of shop drawings, data, and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:
1. as permitting any departure from the Contract requirements;
 2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;
 3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.
- B. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.
- C. If the shop drawings, data, or samples as submitted describe variations and show a departure from the Contract requirements which Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.
- D. Submittals will be returned to the Contractor under one of the following codes.

Code 1 - "NO EXCEPTION TAKEN" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 - "MAKE CORRECTIONS AS NOTED". This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The

Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 - "SUBMIT SPECIFIED ITEM". This combination of codes is assigned when confirmation of the notations and comments IS required by the Contractor. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within 10 calendar days of the date of the Engineer's transmittal requiring the confirmation.

Code 4 - "REVISE AND RESUBMIT". This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the Engineer within 10 calendar days of the date of the Engineer's transmittal requiring the resubmittal.

Code 5 - "REJECTED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

- E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.
- F. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor and will be considered "Not Approved" until resubmitted. The Engineer may, at his/her option, provide a list or mark the submittal directing the Contractor to the areas that are incomplete.
- G. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least 7 working days prior to release for manufacture.
- H. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.6 DISTRIBUTION

- A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the

Engineer. The number of copies shall be as directed by the Engineer, but shall not exceed 6.

1.7 SCHEDULES

- A. Provide all schedules required by Articles 2 and 14, and elsewhere in the General Conditions.
- B. The Contractor shall submit a progress schedule before starting any work, in accordance with Article 2.05 of the General Conditions. The Contractor shall review the progress schedule with the Engineer periodically. Such review shall be made on a monthly basis or more frequently as required by the Engineer. The progress schedule shall be updated as required by the Engineer.

1.8 “OR EQUAL”

- A. Should the Contractor seek approval of a product other than the brand or brands named in these specifications, it shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. Where the specified requirements involve conformance to recognized codes or standards the Contractor shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and bearing an authorized signature.
- B. Manufacturers’ standard data and catalog cut sheets will not be considered sufficient in themselves, and the Engineer will not be responsible for seeking further data from the manufacturer, or for otherwise researching the product. Failure to provide complete data will be cause for rejection of the product.
- C. The Contractor shall be responsible for all additional costs including license fees, foundation, piping, and electrical work necessary to accommodate the proposed “or equal” equipment. Items which result in a cost reduction shall be presented and a change order reflecting 65% of the cost savings will be prepared and the contract price modified.

1.9 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

- A. If specifically required in other Sections of these Specifications, the Contractor shall submit a P.E. Certification for each item required, in the form attached to this Section, completely filled in and stamped.

1.10 GENERAL PROCEDURES FOR SUBMITTALS

- A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be

authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01300

P.E. CERTIFICATION FORM

The undersigned hereby certifies that they are a Professional Engineer registered in the Commonwealth of Massachusetts and that they have been employed by (Name of Contractor) _____ to design _____ in accordance with Specification Section _____ for the Cedarwood Water Storage Tank Rehabilitation project. The undersigned further certifies that they have performed the design of the _____, that said design is in conformance with all applicable local, state and federal codes, rules, and regulations, and that their signature and P.E. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the Owner or the Owner's representative within seven days following written request therefor by the Owner.

P.E. Name

Signature

Address

Contractor's Name

Signature

Title

Address

CHANGE ORDER FORM
For
Cedarwood Water Storage Tank Rehabilitation Project
Waltham, MA

Date: _____

Change Order No.: _____

To: _____

The terms and conditions of the original Contract for this project shall govern this change.

Description of Change:

Total Amount of this Change Order: \$ _____

Original Contract Price: \$ _____

Adjusted Contract Price due to Previous Change Orders: \$ _____

The New Contract Price due to this Change Order will be: \$ _____

Change to Contract Time: _____ days

RECOMMENDED BY: _____

Title

ACCEPTED BY: _____

Title

ACCEPTED BY: _____

City of Waltham

Title

SECTION 01311

CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Prepare and submit to Engineer for review projected construction schedules prior to Pre-Construction Meeting. Update and revise schedules periodically to reflect progress of work and at a minimum with each progress payment request.

1.3 FORM OF SCHEDULES

- A. Prepare in form of network analysis system using the Critical Path Method.
- B. Perform data preparation, analysis, charting, and updating in accordance with pertinent recommendations contained in current edition of "CPM in Construction" manual of the Associated General Contractors.
- C. The network analysis system shall consist of a detailed network, mathematical analysis and a network diagram.

1. The network diagram shall show the order and interdependence of activities and the sequence in which the work is to be accomplished as planned by the Contractor. The basic concept of a network analysis diagram will be followed to show how the start of a given activity is dependent on the completion of preceding activities and its completion restricts the start of following activities.
2. Detailed network activities shown on the network diagram shall include, in addition to construction activities, the submittal for approval of samples and shop drawings, the procurement of critical materials and equipment and their installation and testing.
3. Related activities shall be grouped on the network. The activities on the critical paths shall be highlighted. The network shall be time scaled using units of approximately one-half inch equals one week or other suitable scale approved by the Engineer. Weekends and holidays shall be indicated. Where slack exists, the activities shall be shown at the earliest time they are scheduled to be accomplished. Sheet size shall be 22" x 34" minimum.
4. The mathematical analysis of the network diagram shall include a tabulation of each activity shown on the detailed network diagram. The following information shall be furnished as a minimum for each activity:
 - a. Preceding and following event numbers
 - b. Activity description
 - c. Estimated duration of activities in units of working days (being the best estimate available at time of computation)
 - d. Earliest start date (by calendar date)
 - e. Earliest finish date (by calendar date)
 - f. Scheduled or actual start date (by calendar date)
 - g. Scheduled or actual finish date (by calendar date)
 - h. Latest start date (by calendar date)
 - i. Latest finish date (by calendar date)
 - j. Slack or Float

- k. Monetary value of activity
 - l. Responsibility for activity (Prime Contractor, subcontractors, suppliers)
 - m. Manpower required by trade and by total. Graphic representatives will be allowed
 - n. Equipment required
5. The mathematical analysis shall list the activities in sorts or groups as follows:
- a. By the preceding event number from lowest to highest and then in the order of the following event number
 - b. By the amount of slack, then in order of activity number
 - c. By responsibility in order of earliest start date

1.4 REVIEW OF SYSTEM

- A. Participate in a review and evaluation of the proposed network diagrams and analysis by the Engineer. Revisions necessary as a result of this review shall be resubmitted to the Engineer within 10 days after the conference. Twenty days will be allowed for checking and further action by the Engineer. Progress payments will be withheld pending attainment of a mutually acceptable schedule. The mutually acceptable schedule shall then be the schedule to be used by the Contractor for planning, organizing, directing, and executing the Work and for reporting progress. If the Contractor thereafter desires to make changes in his method of operating and scheduling, he shall notify the Engineer in writing stating the reasons for the change. If the Engineer considers these changes to be of a major nature, he may require the Contractor to revise and submit, without additional cost to the Owner, all of the affected portion of the network diagram and mathematical analysis to show the effect on the entire project. A change may be considered of a major nature if the time estimated to be required or actually used for an activity or the logic of sequence of activities is varied from the original plan to a degree that there is reasonable doubt as to the effect on the Contract completion date or dates. Changes which effect activities with adequate slack time shall be considered as minor changes, except that an accumulation of minor changes may be considered as a major change when their cumulative effect might affect the Contract completion date.

1.5 UPDATES

- A. Submit at intervals of 30 days a report of the actual construction progress by updating the mathematical analysis. All contract changes, including pending and approved change orders and field orders shall be included in the update schedule. Revisions causing changes in the detailed network shall be noted on the network or a revised issue of the affected portions of the detailed network furnished. The network shall be revised as necessary for the sake of clarity.
- B. The report shall show the activities or portions of activities completed during the reporting period and their total value as basis for the Contractor's periodic request for payment. Coordinate with the schedule of breakdown of lump sum items. The report shall state the percentage of the Work actually completed and schedule as of the report date and the progress along the critical path in terms of days ahead or behind the allowable dates. If the project is behind schedule, progress along other paths with negative slack shall be reported. Percentage of work actually completed will be reviewed by the Engineer. If the Contractor fails to submit the required monthly reports and updates within the time prescribed, the Engineer may withhold approval of progress payment estimates until such time as the Contractor submits the required reports and updates. Three copies of the report shall be submitted for each update.
- C. Simultaneously submit a narrative report with the updated analysis which shall include but not be limited to a description of the problem areas, current and anticipated delaying factors, their impact, and an explanation of corrective actions taken or proposed.

1.6 SUBMITTALS

- A. Within 15 days after execution of the AGREEMENT, submit 3 copies of a preliminary schedule indicating planned operations during first 60 days. Include cost of activities expected to be completed before submission and approval of the complete schedule.
- B. Within 30 days after execution of the AGREEMENT, submit 3 copies of the complete network analysis system. After review, submit 3 copies of the mutually acceptable system.

- C. Submit 3 copies of monthly reports and updates with each progress payment request or by the tenth day of the month if no request is made.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01311

SECTION 01350

HEALTH AND SAFETY PLAN

PART 1 - GENERAL

1.1 SUMMARY

- A. The Contractor shall, prior to the start of work on the site, prepare and submit for review a site-specific health and safety plan. Work may not proceed at the project site until the Owner and/or Engineer have reviewed and approved the Contractor's health and safety plan. Any delays incurred by the Contractor relating to reviews of the health and safety plan shall be the responsibility of the Contractor and constitute no additional costs or claims to the Owner. The Contractor is responsible for all safety precautions and maintaining a safe work site.
- B. The Excavation of contaminated soils areas is not anticipated. However, the Contractor shall provide appropriate equipment (e.g., temporary fencing, drums) in the event hazardous materials are spilled or encountered.
- C. Individuals involved in the excavation of potentially impacted soils shall be properly informed and trained in the recognition and response strategies involved with the hazards posed by these contaminants.
- D. The Contractor shall be cognizant of the minimum standards set forth in OSHA 29 CFR 1910.120. The health and safety plan shall include, but not be limited to the following:
 - 1. Identification of Contractor's Site Safety Officer.
 - 2. Identification of Contractor's Designated Field Personnel.

3. Type of Medical Surveillance Program.
4. Identification of Hazard and Risks Associated with the Project, such as pipe installation, excavation, dewatering, tank rehabilitation, confined space work, mechanical and electrical work, and all work from subcontractors.
5. Contractor's Standard Operating Procedures including Personnel Training and Field Orientation; Personal Hygiene Requirements & Guidelines; Field Monitoring Requirements of Site Contaminants; Respiratory Protection Training & Requirements; Levels of Protection and Selection of Equipment Procedures; Zone Delineation of the Project Site; Site Security and Entry Control Procedures; Contingency and Emergency Procedures; and Listing of Emergency Contacts.
6. Contractor's air monitoring plan (if required) immediately adjacent to the work area, and at the fence line.
7. Contractor's dust suppression plan. If air monitoring indicates a higher level of protection than modified Level D, work will stop at no cost to Owner until proper engineering controls/dust suppression sufficiently address the elevated air monitoring results. Modified Level D protection for all onsite personnel is the minimum project requirement.
8. The Contractor must be aware of site-specific requirements such as site security during non-working hours, limited work space, working adjacent to surface water bodies, and minimizing the effects of soil excavation to adjacent structures.
9. The Contractor shall make available complete sets of personal protective equipment and clothing to the Owner and Engineer for use during site inspections by the Owner and Engineer. These shall be supplied and maintained at no cost to the Owner and shall be returned to the Contractor upon completion of the Work, except for expendable disposal protective clothing. Contractor shall provide a repository for collection of disposable health and safety materials. Collection and disposal of contaminated expendable supplies shall be at cost to the Contractor.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01350

SECTION 01400

QUALITY ASSURANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section covers Quality Assurance and Control requirements for this contract.
- B. The Contractor is responsible for controlling the quality of work, including work of its subcontractors and suppliers and for assuring the quality specified in the Technical Specifications is achieved.
- C. Refer to Article 7 (Contractor's Responsibilities) of the GENERAL CONDITIONS.

1.3 TESTING LABORATORY SERVICES

- A. All tests which require the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing laboratory acceptable to the Engineer. The laboratory must be certified by the Commonwealth of Massachusetts for the parameters tested and required under the project. The laboratory shall be staffed with experienced technicians, properly equipped, and fully qualified to perform the tests in accordance with the specified standards.
- B. Preliminary Testing Services: Unless otherwise specified, the Contractor shall be responsible for all testing laboratory services in connection with concrete materials and mix designs, the design of asphalt mixtures, gradation tests for structural and embankment fills, backfill materials, and all other tests and engineering data required for the Engineer's review of materials and equipment proposed to be used in the Work. The Contractor shall obtain the Engineer's acceptance of the testing laboratory before having services performed, and the Contractor shall pay all costs for services.
- C. Quality Control Testing Services: Perform all quality control tests in the field or in the laboratory on concrete, asphalt mixtures, moisture-density (Proctor) and gradation tests on structural and embankment fills, and backfill materials, in-place field density tests on structural and embankment fills, and other materials and equipment, during and after their incorporation in the Work. Field sampling and testing shall be performed in the general manner indicated in the specifications, with minimum interference with construction operations. The Engineer shall determine the exact time and location of field sampling and testing and may require such additional

sampling and testing as necessary to determine that materials and equipment conform with data previously furnished by Contractor and with the Contract Documents.

- D. Arrangements for delivery of samples and test specimens to the testing laboratory will be made by the Contractor. The laboratory tests shall be performed within a reasonable time consistent with the specified standards. Furnish a written report of each test to the Engineer.
- E. Contractor shall furnish all sample materials and cooperate in the sampling and field-testing activities, interrupting the Work when necessary. When sampling or testing activities are performed in the field, the Contractor shall furnish personnel and facilities to assist in the activities.
- F. The Contractor shall not retain any testing laboratory against which the Owner or the Engineer have reasonable objection, and if at any time during the construction process the services become unacceptable to the Owner, or the Engineer, either the Owner or the Engineer may direct in writing that such services be terminated. The request must be supported with evidence of improper testing or unreasonable delay. If the Engineer determines that sufficient cause exists, the Contractor shall terminate the services and engage a different testing laboratory.
- G. Transmittal of Test Reports: Written reports of testing and engineering data furnished by the Contractor for the Engineer's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings.
- H. The testing laboratory shall furnish four copies of a written report of each test performed by laboratory personnel in the field or laboratory to the Contractor. Distribution shall be two copies of each test report to the Engineer's Representative, one copy to the Owner, and one copy for the Contractor within three days after each test is completed.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Refer to Article 3 - Contract Documents: Intent, Amending, Reuse, paragraph 3.3 of the General Conditions.
- B. Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards are needed by the Contractor for superintendence and quality control of the work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, and Engineer.
- C. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. Material and equipment shall not be used by the Contractor for any purpose other than that intended or specified unless such use is authorized by the Engineer.

- D. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.

1.5 OFFSITE INSPECTION

- A. When the specifications require inspection of materials or equipment during the production, manufacturing, or fabricating process, or before shipment, such services shall be performed by an independent testing laboratory, or inspection organization acceptable to Engineer in conjunction with or by the Engineer.
- B. The Contractor shall give appropriate written notice to the Engineer not less than 30 days before offsite inspection services are required, and shall provide for the producer, manufacturer, or fabricator to furnish safe access and proper facilities and to cooperate with inspecting personnel in the performance of their duties.
- C. The inspection organization shall submit a written report to the Contractor who shall provide copies to the Engineer.

1.6 MATERIALS AND EQUIPMENT

- A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.
- B. The Contractor shall comply with manufacturer's printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup, and operation. Should circumstances occur where the contract documents are more stringent than the manufacturer's printed instructions, the Contractor shall comply with the specifications. In cases where the manufacturer's printed instructions are more stringent than the contract documents, the Contractor shall advise the Engineer of the disparity and conform to the manufacturer's printed instructions. In either case, the Contractor is to apply the more stringent specification or recommendation, unless approved otherwise by the Engineer.

1.7 SHOP AND FIELD TESTING

- A. The Contractor is also responsible for providing the shop and field testing specified in the technical specification sections.
- B. The Contractor and its Subcontractor shall perform inspections, tests, and other services as required by the Contract Documents.
- C. Contractor shall provide 21 days' notice to the Engineer so that the Engineer may witness Contractor and/or Subcontractors off site and on-site tests. The Engineer's witnessing of tests does not relieve the Contractor and/or Subcontractors of their obligation to comply with the requirements of the Contract Documents.

1.8 MANUFACTURER'S FIELD SERVICES

- A. When specified in the technical specifications sections, the Contractor shall arrange for and provide technical representation from manufacturer's of respective equipment, items or components. The manufacturer's representative shall be a factory trained service engineer/technician with the type and length of experience specified in the technical specifications.
- B. Services Furnished Under This Contract: An experienced, competent, and authorized factory trained service engineer/technician representative of the manufacturer of each item of equipment for which field services are indicated in the specifications shall visit the site of the Work and inspect, operate, test, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's service representative shall be present when the equipment is placed in operation. The manufacturer's service representative shall revisit the jobsite as often as necessary until all problems are corrected and the equipment installation and operation are satisfactory to the Engineer.

1.9 CERTIFICATION FORMS AND CERTIFICATES

- A. The Contractor shall be responsible for submitting the certification forms and certificates in conformance with the requirements specified in Section 01300 - Submittals.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.1 QUALITY CONTROL

- A. Quality control is the responsibility of the Contractor, and the Contractor shall maintain control over construction and installation processes to assure compliance with specified requirements.
- B. Certifications for personnel, procedures, and equipment associated with special processes (e.g., welding, cable splicing, instrument calibration, surveying) shall be maintained in the Contractor's field office, available for inspection by the Engineer. Copies will be made available to the Engineer upon request.
- C. Means and methods of construction and installation processes are the responsibility of the Contractor, and at no time is it the intent of the Engineer or Owner to supersede or void that responsibility.

END OF SECTION 01400

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 HOURS OF CONSTRUCTION

- A. Normal construction activity shall take place only between the hours of 7 a.m. to 4 p.m., excluding Saturdays, Sundays, and legal holidays. Work outside the above time periods will be permitted only on an emergency basis and only with the written approval of the Owner.
- B. Work in streets, roadways, and areas adjacent to them shall cease at noon on days before legal holidays and at noon on Fridays prior to Monday holidays.

1.4 DIMENSION OF EXISTING STRUCTURES

- A. Where the dimensions and locations of existing structures are of importance in the installation or connection of any part of the Work, the Contractor shall verify such dimensions and locations in the field before the fabrication of any material or equipment that is dependent on the correctness of such information.

1.5 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, fencing, caution signs, lights, and other means to prevent accidents to persons and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access during construction shall be removed when no longer required. The length or size of excavation will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench and requiring that the trench shall not remain open overnight.
- B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lit at night.
- C. Open trenches must be backfilled at the end of the workday.

1.6 INTERFERENCE WITH AND PROTECTION OF STREETS

- A. Contractor shall not close or obstruct any portion of a street, road, or private way without obtaining permits therefore from the proper authorities. If any street, road, or private way shall be rendered unsafe by the Contractor's operations, he shall make such repairs or provide such temporary ways or guards as shall be acceptable to the proper authorities.
- B. Streets, roads, private ways, and walks not closed shall be maintained passable and safe by the Contractor, who shall assume and have full responsibility for the adequacy and safety of provisions made therefore.
- C. The Contractor shall, at least 24 hours in advance, notify the Police, Fire, and School Departments in writing, with a copy to the Engineer, if the closure of a street or road is necessary. He shall cooperate with the Police Department in the establishment of alternate routes and shall provide adequate detour signs, plainly marked and well lighted, in order to minimize confusion.
- D. Construction parking shall be allowed only in areas approved by the Owner.

1.7 WATER FOR CONSTRUCTION PURPOSES

- A. The Contractor will be allowed to use water from the City of Waltham for construction testing and start-up purposes.
- B. The express approval of the Water Department shall be obtained before water is used. Water shall be metered as specified by the City. Hydrants shall only be operated under the supervision of the City of Waltham personnel. Hydrant meters shall be obtained from the Water Department for the standard deposit fee. Contractor shall provide a backflow prevention device on hydrant discharge.

1.8 TEMPORARY UTILITIES

- A. Temporary Light and Power: The Contractor shall, at his own expense, provide his own temporary light and power as required for the prosecution and completion of work.
- B. Temporary Telephone: The Contractor shall have installed at his own expense a job telephone for his use and for the use of the Engineer. The Contractor shall pay all phone charges.
- C. Sanitary Provisions: The Contractor shall provide and maintain sanitary accommodations for the use of his employees and the Engineer, as may be necessary to comply with the requirements and regulations of the local and state departments of health.
- D. Maintaining Operation of the Existing Facilities:
 - 1. The Contractor shall be responsible for careful consideration of the construction, scheduling, and anticipation of potential interference with existing utilities, operations, and structures. The Contractor shall maintain

close communications with the Engineer and provide the Engineer with a detailed description of each proposed activity sufficiently in advance of its commencement for review and comments to be made.

2. The Cedarwood water storage tank will be taken offline and drained during the months of June, July and August 2024.
3. Temporary facilities which may be required include, but are not limited to, electrical power, lighting, heating, cooling, ventilating, telephone, potable water, fire protection, drainage, sanitary facilities, trench covers, protection of existing utilities, structures, streams, trees and shrubs, access roads, sewage conveyance, and piping.
4. The Contractor shall temporarily relocate two (2) communication antennas mounted on the water storage tank prior to tank rehabilitation work. Communication must remain operational for the duration of the project.

1.9 ACCESS TO THE WORK

- A. The Contractor shall provide sufficient and proper facilities at all times for inspection of all work under this project in preparation or in progress, by the Owner, the agents and employees of the Owner, by authorized representatives of the State of Massachusetts and the Federal Government and by the Engineers.
- B. The Contractor shall furnish the Engineer, or his authorized representative and other personnel mentioned above, with such facilities and assistance as are necessary to ascertain performance of the work in accordance with the plans and specifications.

1.10 PRECAUTIONS DURING ADVERSE WEATHER

- A. During adverse weather and against the possibility thereof, the Contractor shall take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood and building-paper shelters, or other suitable means.
- B. During cold weather, materials shall be preheated, if required, and the materials and adjacent structure into which they are to be incorporated shall be made and kept sufficiently warm so that a proper bond will take place and a proper curing, aging, or drying will result. Protected spaces shall be artificially heated by suitable means which will result in a moist or dry atmosphere according to the particular requirements of the work being protected. Ingredients for concrete and mortar shall be sufficiently heated so that the mixture will be warm throughout when used.

1.13 INSPECTION OF WORK AWAY FROM THE SITE

- A. If work to be done away from the construction site is to be inspected on behalf of the Owner during its fabrication, manufacture, or testing, or before shipment, the Contractor shall give notice to the Engineer of the place and time where such fabrication, manufacture, testing, or shipping is to be done. Such notice shall be in

writing and delivered to the Engineer in ample time so that the necessary arrangements for the inspection can be made.

1.15 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

- A. During the course of the work, the Contractor shall keep the site of his operations in as clean and as neat a condition as is possible. He shall dispose of all residue resulting from the construction work and, at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures, and any other refuse remaining from the construction operations, and shall leave the entire site of the work in a neat and orderly condition.
- B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his subcontractors shall comply with all applicable Federal, State, and local laws, and regulations concerning waste material disposal, as well as the specific requirements stated in this section and elsewhere in the Specifications.
- C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors, and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his own expense and restore the area impacted.

1.17 DUST CONTROL

- A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of water as necessary, so as to minimize the creation and dispersion of dust.

1.18 POLLUTION CONTROL

- A. The Contractor shall conduct clean-up and disposal operations, as necessary, to comply with state and local ordinances and anti-pollution laws.
- B. Outdoor burning of rubbish and waste material on the site will not be permitted.
- C. Disposal of volatile fluid wastes (such as mineral spirits, oil, gasoline, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01500

SECTION 01610

DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section specifies the general requirements for the delivery, handling, storage, and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.3 TRANSPORTATION AND DELIVERY

- A. Transport and handle items in accordance with manufacturer's printed instructions.
- B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.
- C. Deliveries shall only be allowed during the established work hours between 7:00 a.m. and 3:30 p.m.
- D. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged, or sensitive to deterioration.
- E. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting, and installing.
- F. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.
- G. Provide equipment and personnel to unload all items delivered to the site.
- H. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e., Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.

1.4 STORAGE AND PROTECTION

- A. Store and protect products in accordance with the manufacturer's printed instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Engineer. Instructions shall be carefully followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.
- B. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter.
- C. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous, and reinforcing steel shall be stored off the ground or otherwise to prevent accumulation of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping, or cracking. Brick, block, and similar masonry products shall be handled and stored in manner to reduce breakage, cracking and spalling to a minimum.
- D. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere (even though covered by canvas) shall be stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Engineer. The building shall be provided with ventilation to prevent condensation. Maintain temperature and humidity within the range required by manufacturer.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01610

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Closeout procedures
 - 2. Final cleaning
 - 3. Adjusting
 - 4. Record Documents

1.3 RELATED WORK

- A. Cleaning up requirements are included in Section 01710.

1.4 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's inspection.
- B. Provide submittals to Engineer that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payment, and sum remaining due.
- D. Submit all warranties.
- E. Submit written notice that all subcontractors and suppliers have been paid in full.
- F. Submit written notice showing the disparities of all insurance filings and claims.
- G. Copy of "Statement of Compliance" filed with the Division of Labor and Workforce Development, as required under the State Wage Rate Provisions.

1.5 RECORD DOCUMENTS

- A. Maintain on site, one set of the following documents; actual revisions to the Work shall be recorded in these documents:
1. Contract Drawings
 2. Specifications
 3. Addenda
 4. Change orders and other Modifications to the Contract
 5. Reviewed shop drawings, product data, and samples
 6. Written interpretations and clarifications
 7. Field orders
 8. Field test reports properly verified
 9. Upon completion of the project, Record Drawings shall be submitted to the Engineer
- B. Store As-built Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
1. Manufacturer's name, address and telephone number and product model and serial number
 2. Product substitutions or alternates utilized
 3. Changes made by Addenda and Modifications
- E. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured horizontal and vertical location of excavation limits referenced to permanent surface bounds.
 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.

4. Field changes of dimension of detail.
5. Details not on original Contract Drawings.

1.6 FINAL CLEANING

- A. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.
 1. Clean the site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

1.7 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01700

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SECTION 01710

CLEANING UP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. During its progress, the work and the adjacent areas affected thereby shall be cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed, and all damage repaired so that the public and property owners will be inconvenienced as little as possible.
- B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc., shall, upon completion of the work, be left in a clean and neat condition.
- C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by them; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by them; shall remove all rubbish from any grounds which they have occupied; and shall leave the roads and all parts of the premises and adjacent property affected by their operations in a neat and satisfactory condition.
- D. The Contractor shall thoroughly clean all materials and equipment installed by them and their subcontractors, and on completion of the work shall deliver it undamaged and in fresh and new-appearing condition.
- E. The Contractor shall restore or replace, when and as directed, any public or private property damaged by their work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end, the Contractor shall do as required all necessary highway or driveway, walk, retaining wall, hardscape, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practical as work progresses and shall not be left until the end of the contract period.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01710

DIVISION 2 – SITE CIVIL

02020	Erosion and Sediment Control
02025	Erosion Control Matting System
02200	Earthwork
02616	Ductile Iron Pipe and Fittings
02640	Fire Hydrants, Valves and Appurtenances
02901	Miscellaneous Work
02920	Topsoil
02945	Turf

SECTION 02020

EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies equipment and materials for an erosion and sediment control program for minimizing erosion and siltation during the construction phase of the project. The erosion and sediment control provisions detailed on the Drawings and specified herein are the minimum requirements for installation and maintenance of erosion controls. The Contractor shall provide additional erosion and sediment control materials and methods as required to affect the erosion and siltation control principles specified herein.

1.2 RELATED SECTIONS

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
1. Section 02021 – Erosion Control Matting System
 3. Section 02200 – Earthwork

1.3 SUBMITTALS

- A. Proposed methods, materials to be employed, and schedule for effecting erosion and siltation control and preventing erosion damage shall be submitted for approval. Submittals shall include:
1. List of proposed materials including manufacturer's product data.
 2. Perimeter (Limit of Work) Erosion Controls damaged during construction shall be replaced immediately and installed per the Details. Schedule of any additional erosion control program indicating specific dates for implementing programs in each major area of work, including dewatering sedimentation basin(s), shall be submitted prior to installation.

1.4 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
1. Massachusetts Department of Public Works, and The Commonwealth of Massachusetts Department of Public Works; Construction Standards.
 2. Massachusetts Department of Environmental Protection.

1.5 EROSION CONTROL PRINCIPLES

- A. The following erosion control principles shall apply to the land grading and construction phases:
 - 1. Stripping of vegetation, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.
 - 2. Whenever feasible, natural vegetation shall be retained and protected.
 - 3. Extent of area which is exposed and free of vegetation, the duration of its exposure shall be kept within practical limits.
 - 4. Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbance. Prolonged exposure of unstabilized soil shall not exceed 60 days.
 - 5. Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.
 - 6. Sediment shall be retained on-site.

- B. Erosion Protection
 - 1. Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to two months, and temporary erosion protection when erosion exposure period is expected to be less than two months.
 - 2. Permanent erosion protection shall be accomplished by seeding with grass and covering with an erosion protection material, as appropriate for prevailing conditions.
 - 3. Temporary erosion protection shall be accomplished by covering with an erosion protection material, as appropriate for prevailing conditions.
 - 4. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 3:1 (horizontal: vertical) cut slopes shall be limited to a grade of 2:1.

PART 2 - PRODUCTS

2.1 FILTER SOCK

- A. Filter sock for construction of erosion control devices shall be blown or placed media (mulch or compost) in twelve-inch diameter biodegradable filter sock.

- B. Wooden stakes (2 inches by 2 inches by 36 inches) shall be placed 10 feet on center, driven a minimum of 12 inches into the ground.

2.2 SILT BAGS

- A. Silt bags shall be utilized for trench dewatering activities. If dewatering is required, Contractor shall submit plan with materials and discharge location to Engineer for approval.

2.3 TEMPORARY SEED COVER

- A. If required, seed mixture for temporary cover by hydroseeding application shall conform to the following:

<u>Quantity per 1000 sq. ft. Coverage</u>	<u>Material</u>
27-1/2 lb.	Wood Fiber Mulch
4 lb.	Seed
1/2 lb.	Annual Ryegrass
22 lb.	10-6-4 Fertilizer
69 gal.	Water

- B. Hydroseeding Equipment

1. Hydroseeding equipment may be either portable or truck mounted, with dual agitation, a minimum working volume of 1000 gallons and a minimum spray range of 80 feet.
2. Hydroseeding equipment must be capable of uniformly applying the slurry mix including wood fiber mulch if required, at the specified rate, and at the required locations.
3. Hydromulching equipment, either trailer or truck mounted, must be capable of uniformly applying straw or hay mulch at a minimum mulching rate of 8 tons per hour, at a distance of not less than 80 feet.

PART 3 - EXECUTION

3.1 HYDROSEEDING

- A. If required for long-term disturbance greater than 60 days, seed for temporary cover shall be spread by the hydroseeding method, utilizing power equipment commonly used for that purpose. Seed, fertilizer, mulch, and water shall be mixed and applied to achieve application quantities specified. Material shall be applied in 2 equal applications, with the equipment during the second pass moving perpendicular to direction employed during the first pass. Hydroseeding shall not be done when it is raining or snowing, or when wind velocity exceeds 5 mph.
- B. If the results of hydroseeding application are unsatisfactory, the mixture and/or application rate and methods shall be modified to achieve the required results.
- C. After the grass has appeared, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be reseeded and such areas and parts of areas seeded repeatedly until all areas are covered with a satisfactory growth of grass.

3.2 MAINTENANCE AND REMOVAL OF EROSION CONTROL DEVICES

- A. Wetland area, water courses, and drainage swales adjacent to construction activities shall be monitored continuously for evidence of silt intrusion and other adverse environmental impacts, which shall be corrected immediately upon discovery.
- B. Culverts and drainage ditches shall be kept clean and clear of obstructions during construction period.
- C. Erosion Control Devices
 - 1. Sediment behind the erosion control device shall be checked twice each month and after heavy rain. Silt shall be removed if greater than 6 inches deep.
 - 2. Condition of erosion control devices shall be checked twice each month or more frequently as required. Damaged and/or deteriorated items shall be replaced. Erosion control devices shall be maintained in place and in effective condition.
 - 3. Filter sock shall be inspected frequently and maintained or replaced as required to maintain both their effectiveness and essentially their original condition. Underside of bales shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath bales.
 - 4. Sediment deposits shall be properly disposed of, in a location and manner which will not cause sediment nuisance elsewhere.
- D. Removal of Erosion Control Devices
 - 1. Erosion control devices shall be maintained until all disturbed earth has been vegetated or restored. After removal, areas disturbed by these devices shall be regraded and seeded.
 - 2. Erosion protection material shall be kept securely anchored until acceptance of the entire Project.

END OF SECTION 02020

SECTION 02025

EROSION CONTROL MATTING SYSTEM

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Furnish and install an erosion control matting system consisting of tied concrete block mats with a 10oz non-woven geotextile underlayment cast and adhered to the back of the blocks.
- B. Work includes preparation of subgrade as shown on the Drawings, bedding and subbase materials shown on the Drawings and as recommended by system manufacturer. Contractor shall furnish and place the concrete block matting system in accordance with this specification and conforming with the lines, grades, design, and dimensions shown on the Drawings.

1.2 SUBMITTALS – as described in Section 01300.

PART 2 – PRODUCTS

2.1 CONCRETE BLOCK MATS

- A. Tied Concrete Block Mats with 10oz non-woven underlayment shall be Flexamat-10NW, manufactured by Motz Enterprises, Inc., or approved equal.
- B. Mats shall be manufactured from individual concrete blocks tied together with high strength knitted polypropylene bi-axial geogrid. Each block is tapered, beveled and interlocked and includes connections that prevent lateral displacement of the blocks within the mats when they are lifted for placement.
- C. Concrete blocks shall be manufactured with concrete conforming to the cement requirements of ASTM C150 and to the aggregate requirements of ASTM C33. Blocks shall have a minimum weight of 3 lbs. per block and placed no further than 2 in. apart. Material shall have a weight per square foot not exceeding 10 lbs. Blocks shall have a 2.25" profile, a flat-top pyramid shape, and a coarse finish without protrusions. Concrete shall have a minimum compressive strength requirement in the following table and certified by a third party.

Concrete Compressive Strength Requirements Age	Required Compressive Strength psi
7 - Day	5000 psi
14 - Day	6000 psi
28 - Day	6900 psi

2.2 GEOGRID

- A. The polypropylene interlocking geogrid shall be an open knitted fabric composed of high tenacity, multifilament polypropylene yarns knitted and coated in tension with an acrylic based coating which is designed to resist degradation in environments with exposure to water and low pH (4 pH) and high pH (>9 pH).
- B. The geogrid shall be within the base of the concrete blocks.
- C. Geogrid shall meet the requirements in the following table:

Polypropylene Bi-Axial Geogrid Property	Unit	Test	Requirement
Mass/Unit Area	oz/yd ²	ASTM D5261	6.5 oz/yd ²
Aperture Size	English units	Measured	1.4x 1.4 inch
Ultimate Wide Width Tensile Strength (MD x CMD)	lb/ft	ASTM D6637	2,055 lb/ft
Elongation at Ultimate Tensile Strength (MD x CMD)	%	ASTM D6637	6%
Wide Width Tensile Strength @ 2% (MD x CMD)	lb/ft	ASTM D6637	822 lb/ft
Wide Width Tensile Strength @ 5% (MD x CMD)	lb/ft	ASTM D6637	1,640 lb/ft
Tensile Modulus @ 2% (MD x CMD)	lb/ft	ASTM D6637	41,100 lb/ft
Tensile Modulus @ 5% (MD x CMD)	lb/ft	ASTM D6637	32,800 lb/ft

- D. Mats shall have an 8” extension of the polypropylene bi-axial geogrid and an 8” extension of the 10oz. non-woven geotextile extending along the long length of one edge of the mat. The geogrid and underlayment extension are an overlap for the subsequent mat to be installed over.

2.3 SYSTEM PERFORMANCE TESTING

- A. Full-Scale laboratory testing performed by an independent 3rd party testing facility with associated engineered calculations certifying the hydraulic capacity of the Erosion Control Mat meets the following requirements:

TEST	Tested Value	Bed Slope	Soil Classification	Limiting Value
ASTM 6460	Shear Stress	30%	Sandy Loam (USDA)	24lb./ft ²
ASTM 6460	Velocity	20%	Loam (USDA)	30 ft./sec

PART 3 – EXECUTION

3.1 DELIVERY AND STORAGE

- A. Cover the delivered matting system or otherwise protect it during long periods of storage to protect against degradation of the backing material as recommended by the manufacturer.
- B. All mats to be inspected upon delivery. Assure that all units are sound and free of defects that would interfere with the proper placing of the unit or impair the strength or permanence of the construction.
- C. Chipping or missing concrete resulting in a weight loss exceeding 15% of the average weight of a concrete unit is grounds for rejection by the engineer. Replace, repair or patch the damaged areas per the manufacturer’s recommendations.

3.2 INSTALLATION

- A. Provide the proper equipment to place the mat that will not damage the mat material or disturb the subgrade.
- B. Prior to installing matting system, prepare the subgrade as detailed in the plans. All subgrade surfaces to be smooth and free of rocks, roots, debris, or other protrusions that would prevent intimate contact between the block and the subgrade. When seeding is shown on the plans, provide subgrade material that can sustain growth.
- C. Ensure the prepared subgrade provides a smooth, firm, and unyielding foundation for the mats.

- D. Install mats to the line and grade shown on the plans and per the manufacturer's guidelines. The manufacturer or authorized representative will provide technical assistance during the surface preparation and installation of the concrete block mats as needed.
- E. Provide a minimum 18 in. deep mat embedment toe trench at all edges exposed to concentrated flow.
- F. When needed, provide fastening or anchoring as recommended by the manufacturer or engineer for the site conditions.

END OF SECTION 02025

SECTION 02200

EARTHWORK

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes excavations of normal depth in earth for trenches and structures; backfilling such excavations to the extent required; filling; rough grading; cofferdamming; constructing embankments; miscellaneous earth excavation; temporary excavation support; the removal, hauling, and stockpiling of suitable excavated material for subsequent use in the work; all rehandling, hauling, and placing of stockpiled materials for use in refilling, filling, backfilling, grading, and such other operations; the removal and satisfactory disposal off-site of unsuitable material; compaction; and appurtenant work, complete, in accordance with the Drawings and Specifications, and as directed.
- B. Drawings and general provisions of Division 0 - Bidding and Contract Requirements and other Division 1 Specification Sections apply to this section. Related Sections include the following:
 - 1. Section 02020 – Erosion and Sediment Control
 - 2. Section 02025 – Erosion Control Matting System
 - 3. Section 02616 – Hydrants and Valves
 - 4. Section 02640 – Ductile Iron Pipe and Fittings

1.2 SUBMITTALS

- A. General. Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Backfill Materials. If requested by the Engineer, MassDOT representative, or the MassDOT permit for this project, the Contractor shall pay for and submit a grain size analysis and curve performed in accordance with ASTM D422 for each proposed source of backfill for review by the Engineer. The grain size analysis shall indicate that the backfill material conforms to the gradation requirements specified.
- C. If requested by the Engineer, submit a grain size analysis and a constant head permeability result in accordance with ASTM D422 and ASTM D2434 respectively for each proposed source of the drainage sand for review by the Engineer.
- D. If requested by the Engineer, submit a controlled density fill (CDF) mix design showing the proportions and gradations of all materials.
- E. If requested by the Engineer, submit a moisture-density curve indicating the maximum dry-density and optimum moisture content as determined by ASTM D1557 for each proposed source of backfill for review by the Engineer.

- F. Submit the qualifications of the independent geotechnical testing laboratory performing soil testing and inspection services during earthwork operations. The geotechnical testing laboratory must demonstrate to the Engineer's satisfaction, based on evaluation of laboratory submitted criteria conforming to ASTM D3740, that it has the experience and capability to conduct required field and laboratory geotechnical testing. In addition, the laboratory shall be supervised by a Registered Professional Engineer in the State of Massachusetts.
- G. Submit an excavation, backfilling, and filling plan at least one week prior to start of any earth moving activities. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities, and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods, and sequencing of construction. The plan shall include, but not be limited to the following items:
 - 1. Detailed sequence of work.
 - 2. General description of construction methods.
 - 3. Numbers, types, and sizes of equipment proposed to perform excavation and compaction.
 - 4. Details of dust control measures.
 - 5. Proposed locations of stockpiled excavation and/or backfill materials.
 - 6. Proposed surplus excavated material off-site disposal areas and required permits.

1.3 EXCAVATION CLASSIFICATIONS

- A. Earth Excavation or "Excavation" consists of removal of materials encountered to the subgrade elevations indicated and subsequent reuse or disposal of the materials removed. All excavation is classified as earth excavation unless it otherwise meets the classifications provided below for exploratory excavation, unauthorized excavation, additional excavation, or rock excavation.
- B. Exploratory Excavation, also referred to as test pits, shall consist of the removal of materials for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work. Exploratory excavation shall be performed as shown on the plans and as directed by the Engineer. Exploratory excavation not directed or approved by the Engineer shall be at the Contractor's expense.
- C. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at Contractor's expense.
- D. Additional Excavation:
 - 1. When excavation has reached required subgrade elevations, notify the Engineer who will review subgrade conditions.

2. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the Engineer.
3. Removal of unsuitable material and its replacement as directed will be paid on the basis of contract conditions relative to changes in work or as provided for under the unit rates for this classification.

E. Rock Excavation:

1. Determination of rock excavation classification will be made by the Engineer as and paid on basis of contract conditions relative the changes in work..

1.4 EXCAVATION

- A. The Contractor shall perform all excavations of every description and of whatever substances encountered, in a manner as required to allow for placing of temporary earth support, forms, installation of pipe, and other work, and to permit access to the Engineer for the purpose of observing the work. Excavations shall be to such widths as will give suitable space for the required work. Bottoms of trenches and excavations shall be protected from frost and shall be firm, dry, and in an acceptable condition to receive the work; work shall not be placed on frozen surfaces nor shall work be placed on wet or unstable surfaces.
- B. All excavations made in open cut will be controlled by the conditions existing at the various locations and shall always be confined to the limits as designated by the Engineer. In no case shall earth be excavated or disturbed by machinery so near to the finished subgrade for structures and pipelines as to result in the disturbance of the earth below the subgrade. The final excavation to subgrade should be accomplished with a smooth faced bucket or by hand if directed by the Engineer.
- C. The Contractor shall satisfy all dewatering requirements before performing trench excavations. If the Contractor determines dewatering will be necessary, a plan for discharge shall be approved by the Engineer prior to dewatering activities.

1.5 TEMPORARY EARTH SUPPORT

- A. The Contractor shall furnish, place, and maintain such sheeting, shoring, and bracing at locations necessary to support the sides of excavations and to prevent danger to persons or damage to pavements, facilities, utilities, or structures, and to prevent injurious caving or erosion or the loss of ground, and to maintain pedestrian and vehicular traffic as directed and required.
- B. In all sheeting, shoring, and bracing operations, care shall be taken to prevent injury to persons or damage to structures, facilities, utilities, and services. Any injuries to persons shall be the responsibility of the Contractor; and any damage to the work occurring as a result of settlement, water or earth pressure, or other causes due to inadequate bracing or other construction operations of the Contractor shall be satisfactorily repaired or made good by the Contractor, at no additional expense to the Owner.

- C. Where sheeting is to be used, it shall be driven ahead of excavation operations to the extent practicable so as to avoid the loss of material from behind the sheeting; where voids occur outside of the sheeting, they shall be filled immediately with selected fill, thoroughly compacted.
- D. The Contractor shall leave in place all sheeting and bracing at the locations and within the limits ordered by the Engineer in writing. The Contractor shall cut off the sheeting at elevations to be determined by the Engineer.
- E. Conform to the requirements of the OSHA Standards and Interpretations: “Part 1926 Subpart P – Excavation, Trenching, and Shoring”.
- F. The Contractor shall comply with all Federal, State, and local safety regulations and requirements.

PART 2 – PRODUCTS

2.1 BACKFILL MATERIALS

- A. Gravel borrow. Gravel borrow (structural fill, common fill, or backfill) shall consist of inert material that is hard, durable, stone and coarse sand, and free from frost, frozen lumps, loam and clay, surface coatings, and deleterious materials.

Gradation requirements for gravel shall be determined by AASHTO-T11 and T27 and shall conform to the following:

<u>Sieve Designation</u>	<u>Percent Passing</u>
1/2 in.	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-10

Maximum size of stone in gravel shall be 6 inches for largest dimension.

- B. Dense Graded Crushed Stone. Dense Graded Crushed Stone shall be obtained from approved natural deposits and unprocessed except for the removal of deleterious materials and stones larger than the maximum size permitted.

Dense Graded Crushed Stone shall be unfrozen and substantially free from vegetation, roots, loam and other organic matter, clay, snow, frozen particles, and other fine or harmful substances.

Dense Graded Crushed Stone. Inorganic granular material meeting the following gradation:

<u>Sieve Designation</u>	<u>Percentage Passing</u>
2 in.	100
1-1/2 in.	70 – 100
3/4 in.	50 – 85

No. 4	30 – 55
No. 50	8 – 24
No. 200	0 – 10

- C. Processed gravel. Processed gravel shall be obtained from approved natural deposits and unprocessed gravel except for the removal of deleterious materials and stones larger than the maximum size permitted.

Processed gravel shall be unfrozen and substantially free from vegetation, roots, loam and other organic matter, clay, snow, frozen particles, and other fine or harmful substances.

Processed Gravel. Inorganic granular material meeting the following gradation:

<u>Sieve Designation</u>	<u>Percentage Passing</u>
3 in.	100
1-1/2 in.	70 – 100
3/4 in.	50 – 85
No. 4	30 – 60
No. 200	0 – 10

- D. Crushed stone. Crushed stone shall consist of sound, durable stone, free of any foreign material, angular in shape, free from structural defects, and comparatively free of chemical decay. The stone shall be maximum size of 1-1/2 inches and a minimum size of 1/2 inch. Crushed stone shall be used as ordered by the Engineer.
- E. Topsoil. Friable loam, typical of fertile local topsoil; free from pure clay, weeds, noxious weed seeds, sod, clods and stones larger than 1 inch, toxic substances, litter, or other deleterious material; having a mildly alkaline to medium acid pH between 6.0 and 7.5. Soluble salts shall not exceed 4 milli-mhos per centimeter.

Soil Texture: 20 to 40% fines (silt and clay fraction passing the 200 sieve) and 60 to 80% Sand and gravel. The maximum particle size shall be 1 inch.

Organic Content: 5 to 10%

Additives: As required by soil analysis of Topsoil for lawn areas.

- F. Controlled Density Fill (CDF) or “Flowable Fill”. Controlled density fill shall consist of a flowable, self-consolidating, rigid setting, low density mixture meeting performance standards as specified in Massachusetts Department of Transportation 2022 Standard Specifications for Highway and Bridges, Type 1E. CDF is to be batched at a ready mix plant and is to be used at a high or very high slump of approximately 10 to 12 inches. It shall be flowable, require no vibration and after it has been placed can be excavatable by hand tool and/or small machines. The ingredients shall comply with the following:

Portland Cement – AASHTO M 85
 Fly Ash – AASHTO M 295 Class F
 Sand – M4.02.02 (Massachusetts Highway Specification)

2.2 DUST CONTROL

- A. Calcium chloride shall conform to AASHTO M144, Type I or Type II.

PART 3 – EXECUTION

3.1 EXCAVATION

- A. Cut pavement with a saw or pneumatic tools to prevent damage to remaining pavement without extra compensation. Where pavement is removed in large pieces, dispose of pieces before proceeding with excavation.
- B. Do not remove excavation materials from the site of the work or dispose of except as directed or permitted by the Engineer.
- C. Provide suitable and safe bridges and other crossings where required for accommodation of travel, and to provide access to private property during construction, and remove said structures thereafter.
- D. Trenches shall be excavated to sufficient depths and to sufficient widths for installing new pipe/components where required, placing and removing of decking, sheeting, and bracing, and for pumping and drainage facilities. The bottom of the excavations shall be firm and dry and in all respects acceptable to the Engineer. Trench width and depth shall be a practical minimum, as needed for proper execution for the work, and shall be performed in accordance with the Typical Trench Detail as shown on the Drawings.
- E. While excavating and backfilling is in progress, traffic shall be maintained, and all utilities and other property protected as provided in the General Conditions and General Requirements.
- F. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. The trench may be excavated by machinery to, or just below the designated subgrade, provided that material remaining in the bottom of the trench is no more than slightly disturbed. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory as a result of inadequate excavation, dewatering, or other construction methods shall be removed and replaced by gravel borrow as required by the Engineer at the Contractor's expense.
- G. Clay and organic silt soils are particularly susceptible to disturbance due to construction operations. When excavation is to end in such soils, the Contractor shall use a smooth-edge bucket to excavate the last one foot of depth.
- H. Where pipe is to be laid in crushed stone, the trench may be excavated by machinery to the normal depth of the pipe plus the depth of the stone, provided that the material remaining in the bottom of the trench is no more than slightly disturbed.
- I. Where pipe is to be laid directly on the trench bottom, final excavation at the bottom of the trench shall be performed manually, providing a flat-bottom true to grade upon undisturbed material. Bell holes shall be made as required.

- J. Excavate trenches to depths so as to permit pipe to be laid at elevations, slopes, or depths of cover indicated on drawings, and at uniform slopes between indicated elevations.
- K. Make pipe trenches as narrow as practicable and do not widen by scraping or loosening materials from the sides. Make every effort to maintain sides of trenches firm and undisturbed until backfilling has been placed and compacted.
- L. Excavate trenches with approximately vertical sides for entire depth of trench.

3.2 STOCKPILING OF SURPLUS EXCAVATED MATERIALS

- A. The Contractor shall strip and stockpile excavated trench materials. Any bushes that are removed shall be protected and replanted in the same location. Removed curbing shall be stockpiled in a safe manner. Where grassed areas are disturbed by stockpiled materials, the Contractor shall rake out the area and loam and re-seed at his expense.
- B. Stockpiling of materials shall be included in the pay items for excavating and no allowances shall be made for any stripping and stockpiling requirements.
- C. Should conditions make it impracticable or unsafe to stack material adjacent to the trench, the material shall be hauled and stored at a location provided by the Contractor. When required, it shall be re-handled and used in backfilling the trench.

3.3 PROTECTION OF EXISTING STRUCTURES

- A. Carefully support and protect from damage existing pipes, poles, wires, fences, curbing, property line markers, and other structures which the Engineer determines must be preserved in place without being temporarily or permanently relocated. Should such items be damaged, restore, without compensation therefore, to at least as good condition as that in which they were found immediately before the work was begun. Contractor shall hand dig around existing utilities.
- B. Curbing, fencing, signposts, utility poles, mailboxes, etc. in the vicinity of the Contractor's operations shall be adequately protected, and if necessary, removed and restored after backfilling. All items which are damaged during construction shall be replaced with material fully equal to that existing prior to construction.
- C. Enclose uncut tree trunks adjacent to work in wooden boxes of such height as may be necessary for protection from injury from piled material, equipment, operations, or otherwise due to work. Operate excavating machinery and cranes of suitable type with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.
- D. Cut all branches, limbs, and roots smoothly and neatly without splitting or crushing. Neatly trim, cut the injured portions, and cover with an application of grafting wax or tree healing paint as directed.
- E. Protect cultivated hedges, shrubs, and plants which might be injured by the Contractor's operations by suitable means or dig up and temporarily replant and maintain. After construction operations have been substantially completed, replant in original positions and care for until growth is reestablished. If cultivated hedges, shrubs, and plants are injured to

such a degree as to affect their growth or diminish in their beauty or usefulness, replace by items of equal kind and quality existing at the start of the work.

- F. Do not use or operate tractors, bulldozers, or other power-operated equipment on paved surfaces when their treads or wheels of which are so shaped as to cut or otherwise damage such surfaces.
- G. Restore surfaces damaged by the Contractor's operations to a condition at least equal to that in which they were found immediately before work commenced. Use suitable materials and methods for such restoration.

3.4 RELOCATION AND REPLACEMENT OF EXISTING STRUCTURES

- A. Whenever certain existing structures, as described below, are encountered, and the Engineer so directs, change the location, remove and later restore, or replace such structures, or assist the Owner in doing so. Such work to be paid for under applicable items of work, otherwise as Extra Work.
- B. In removing existing pipes or other structures, include for payment only those new materials which are necessary to replace those unavoidably damaged as determined by the Engineer.
- C. The preceding two paragraphs apply to pipes, wires, and other structures which meet the following: (a) are not indicated on the drawings or otherwise provided for, (b) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (c) in the opinion of the Engineer, will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.

3.5 EXCAVATION SUPPORT SYSTEM

- A. Furnish, put in place, and maintain sheeting and bracing required by Federal, State, or local safety requirements to support the sides of the excavation and prevent loss of ground which could endanger personnel, damage or delay the work, or endanger adjacent structures. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he/she may order additional supports placed at the expense of the Contractor. Compliance with such order shall not relieve the Contractor from his/her responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.
- B. When moveable trench bracing such as trench boxes, manhole boxes, moveable sheeting, shoring, or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the screened gravel backfill.
- C. When installing pipe; trench boxes, moveable sheeting, shoring, or plates shall not be allowed to extend below mid-diameter of the pipe. As trench boxes, moveable sheeting, shoring, or plates are moved, screened gravel shall be placed to fill any voids created and the screened gravel and backfill shall be recomacted to provide uniform side support for the pipe.

- D. The Contractor will be permitted to use steel sheeting in lieu of wood sheeting for the entire job wherever the use of sheeting is necessary. The cost for use of sheeting will be included in the bid items for pipe and shall include full compensation for driving, bracing, and later removal of sheeting.
- E. All sheeting and bracing shall be carefully removed in such manner as not to endanger the construction of other structures, utilities, or property, whether public or private. All voids left after withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as directed.
- F. The Contractor shall receive no payment for sheeting, bracing, etc., during the progress of the work. The Contractor shall receive no payment for sheeting which has actually been left in the trench for the convenience of the Contractor.
- G. Sheeting driven below mid-diameter of any pipe shall remain in place from the driven elevation to at least 1 foot above the top of the pipe.

3.6 BACKFILLING

- A. As soon as practicable after the pipe has been laid and jointed and inspected by the Engineer, backfilling shall begin and thereafter be prosecuted expeditiously. Select backfill shall be placed by hand shovel in 6-inch-thick lifts up to the springline of the pipe. This area of backfill is considered the zone around the pipe and shall be thoroughly compacted before the remainder of the trench is backfilled.
- B. Where the pipes are laid in streets or traveled ways, the remainder of the trench up to a depth of 12 inches below the bottom of the specified permanent drive surface shall be backfilled with gravel borrow material in layers not to exceed 6 inches and thoroughly compacted.
- C. To prevent longitudinal movement of the pipe, dumping backfill material into the trench and then spreading will not be permitted until selected material or screened gravel has been placed and compacted to a level 12 inches over the pipe.
- D. Unfavorable Conditions:
 - 1. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread, or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.
 - 2. In freezing weather, a layer of fill shall not be left in an uncompacted state at the close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth wheeled roller to eliminate ridges of soil left by compaction equipment.
- E. Backfilling and filling operation shall be suspended in areas where tests are being made until tests are completed and the testing laboratory has advised the Engineer that adequate densities are obtained.

- F. Subject to the approval of the Engineer, fragments of ledge and boulders smaller than 6 inches may be used in trench backfill providing that the quantity, in the opinion of the Engineer, is not excessive. Rock fragments shall not be placed until the pipe has at least 2 feet of earth cover. Small stones and rocks shall be placed in thin layers alternating with earth to ensure that all voids are completely filled. Fill shall not be dropped into the trench in a manner to endanger the pipe.
- G. All road surfaces shall be broomed and hose-cleaned immediately after backfilling. Dust control measures shall be employed at all times.
- H. Exploratory excavation shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as specified.

3.7 COMPACTION

- A. **Compaction Requirements.** The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Method C. The compaction requirements are as follows:

Area	ASTM Density Degree of Compaction
Gravel drive sub-base	95%
General fill below gravel drive sub-base	92%

- B. **Moisture Control:**
 1. Fill that is too wet for proper compaction shall be dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill.
 2. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density.
- C. **Compaction Control:**
 1. In-place density tests shall be made in accordance with ASTM D1556, D2922, or D2167 as the work progresses, to determine the degree of compaction being attained by the Contractor. Any corrective work required as a result of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to the Owner. In-place density tests will be made by a geotechnical engineer selected by the Engineer or the Contractor's independent testing laboratory at the Contractor's expense.
 2. The Engineer's duties do not include supervision or direction of the actual work by the Contractor, his employees, or agents. Neither the presence of the Engineer nor any observation and testing performed by him shall excuse the Contractor from defects discovered in his work at that time or subsequent to the testing.

D. Material Testing Frequency. The following testing frequencies are minimum required for all structural and non-structural fill, grading, and embankment.

1. Field In-Place Density and Moisture Content. Screened gravel and crushed stone shall be compacted as specified and indicated. For other backfill and fill materials, minimum test frequency shall be as follows, and no less than one test per lift:
 - a. Trenches under structures foundation preparation or roadways sub-base: Every 100 lin. ft. per lift.
 - b. Trenches in areas without structures or roadways: Every 250 lin. ft. per alternate lift.
 - c. Paved Roadways: Every 100 lin. ft. per lift.
 - d. Paved Areas: 2,000 sq. ft. per lift.
 - e. Under Structure: 1,000 sq. ft. per lift.
 - f. Around Structures: 1,500 sq. ft. per lift.
 - g. Embankment Fills: 5,000 sq. ft. per lift.
2. Moisture Density. One per source, except for screened gravel and crushed stone. Repeat the moisture density test for every 1,000 cubic yard of material use, and whenever visual inspection indicates a change in material gradation as determined by the Engineer.
3. Gradation Analysis. A minimum of one per source and for each moisture density test, and whenever visual inspection indicates a change in material gradation.
4. Liquid Limit, Plastic Limit, and Plasticity Index. Minimum of one test per 500 cubic yards [382 cubic meters] of soil for use as fill material and whenever classification of material is in doubt as determined by the Engineer.

E. Compaction Methodology:

1. Each layer of backfill material shall be thoroughly compacted by rolling, tamping, or vibrating with mechanical compacting equipment or hand tamping. If rolling is employed, it shall be by use of a suitable roller or tractor, being careful to compact the fill throughout the full width of the trench.
2. Backfilling operations shall be such that material is compacted in 6-inch lifts, including the trench around the barrel of the pipe. Compaction of each lift up to a minimum of 12 inches above the pipe shall be done by use of power-driven tampers weighing at least 20 pounds or by vibratory compactors. Care shall be taken as to not place excessive pressure on the new pipe.
3. Vibratory mechanical compaction is the preferred method for compaction. Should jetting be proposed by the Contractor, its viability to achieve the required degree

of compaction shall be proven on a test section of trench, prior to allowing its use on a widespread basis. Compaction testing shall be used to determine the effectiveness of the jetting operation. Jetting shall be accomplished using a rigid pipe, long enough to reach deep into the trench. Large volumes of water under high pressure, equivalent to that available from a fire hydrant, are necessary for jetting. The Contractor is made aware that municipal water will not be available due to limited supply. The Contractor shall provide water for jetting operations at his own expense. Jetting locations shall be frequent enough to achieve required compaction.

4. Where other methods are not practicable, compaction shall be by use of hand or pneumatic ramming with tools weighing at least 20 pounds. The material being spread shall be compacted in layers not over 6 inches thick. If necessary, sprinkling shall be employed in conjunction with rolling or ramming.
5. In backfilling trenches, each layer of backfill material shall be moistened and compacted to a density at least equal to that of the surrounding undisturbed earth, and in such a manner as to permit the rolling and compaction of the filled trench or excavation with the adjoining earth to provide the required bearing value, so that paving of the excavated and disturbed areas, where required, can proceed immediately after backfilling is completed.

3.8 FINE GRADING

- A. Before surface or sub-base is spread, the subgrade shall be shaped to a true surface conforming to the Drawings. All depressions and high spots shall be filled with suitable material or removed and such areas again compacted until the surface is smooth and properly compacted. A tolerance of 1/2-inch above or below the finished subgrade will be allowed provided that this 1/2-inch above or below grade is not maintained for a distance longer than 50 feet and that the required crown is maintained in the subgrade. Any portion which is not accessible to a roller shall be thoroughly compacted by other mechanical methods.
- B. Construction Tolerances:
 1. Construct finished surfaces to plus or minus 1 inch of the elevations indicated.
 2. Grade cut and fill areas to plus or minus 0.20 feet of the grades indicated.
 3. Complete embankment edges to plus or minus 6 inches of the slope lines indicated.
 4. Provide the Engineer with adequate survey information to verify compliance with above tolerances.

3.9 DUST CONTROL

- A. Calcium chloride shall be applied when ordered by the Engineer and only in areas which will not be adversely affected by the application.
- B. Calcium chloride shall be uniformly applied at a rate of 1-1/2 pounds per square yard or at any other rate as directed by the Engineer. Application shall be by means of a mechanical

spreader, or other approved method. The number and frequency of applications shall be determined by the Engineer.

END OF SECTION 02200

SECTION 02616

DUCTILE-IRON PIPE AND FITTINGS

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Furnish all materials, equipment, labor, and incidentals; provide for the installation and testing of all ductile-iron pipe and fittings, as indicated and specified.

1.2 RELATED WORK

- A. Related sections include the following:
 - 1. Section 02200 – Earthwork
 - 2. Section 02640 – Fire Hydrants, Valves, and Appurtenances

1.3 SUBMITTALS

- A. Shop Drawings. Submit the following in accordance with Section 01300 - Submittals:
 - 1. Submit shop drawings or descriptive literature, or both, showing dimensions, joint, and other details for each type and class of pipe, fitting, and restraint system to be furnished for the project. All materials furnished under the Contract shall be manufactured only in accordance with the Specifications. Submittals shall include material information, dimensions, pipe class information, weights, coating, and lining system data.
 - 2. Submit manufacturer's Certificates of Compliance with these Specifications and certification that the ductile-iron pipe and fittings have been manufactured and tested in accordance with AWWA/ANSI specifications.
 - 3. Submit the vendor's name, address, and contact phone number for all materials to be furnished under the contract.
 - 4. Submit a detailed description of proposed testing, flushing, and disinfection procedures to be used for this project. The description shall contain the name of the person responsible for the testing, flushing, and disinfection work, equipment to be used, chemical to be used, method of measuring flow during flushing procedures, and the name of the laboratory to be used for analysis. Review of the description shall not be construed as approval of any methods to be used; the Contractor shall be fully responsible for achieving the specified test results.

1.4 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 - Quality Assurance, and as specified.
- B. Inspect and test at foundry according to applicable standard specifications.

- C. Owner reserves right to inspect and test by independent service at manufacturer's plant or elsewhere at his own expense.
- D. Visually inspect and hammer test before installation.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Section 01610 - Delivery, Storage, and Handling.

1.6 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs 60,000 PSI Tensile Strength.
- B. American Water Works Association (AWWA)
 - 1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pressure Pipe and Fittings
 - 2. AWWA C105 - Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids
 - 3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings for Water
 - 4. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 5. AWWA C115 - Standard for Flanged Ductile-Iron Pipe with Threaded Flanges
 - 6. AWWA C150 - Thickness Design of Ductile-Iron Pipe
 - 7. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids
 - 8. AWWA C153 - Ductile-Iron Compact Fittings, 3-in through 16-in for Water and Other Liquids
 - 9. AWWA C203-20 - Coal-tar Protective Coatings and Linings for Steel Water Pipe
 - 10. AWWA C600 - Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances
 - 11. AWWA C606 - Grooved and Shouldered Joints
 - 12. AWWA C651 - Disinfecting Water Mains
- C. American National Standards Institute (ANSI)
 - 1. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings
- D. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 – PRODUCTS

2.1 PIPE

- A. Ductile-Iron:

1. Ductile-iron pipe shall be that of a North American manufacturer who can demonstrate at least 5 years of successful experience in manufacturing ductile-iron pipe. The pipe shall be equipped with push-on type, restrained joint, or mechanical joints, as required.
2. Ductile-iron pipe shall conform to the latest edition of AWWA C150 and C151, Class 52. Water mains shall be double-cement-lined inside conforming to AWWA C104, and asphalt seal coated outside (coal-tar coated outside conforming to AWWA 203 in areas where groundwater levels are above the pipe laying depth).
2. The ductile-iron pipe shall be Class 52 and furnished in nominal 18-foot lengths, with push-on type Joints as manufactured by U.S. Pipe and Foundry Company, Griffin Pipe Co., Clow Corporation, or approved equal with gaskets and bronze wedges conforming to AWWA C111/ANSI A21.11 "Rubber Gasket Joints".
3. Metal core warning tape shall be installed 1 foot above all new water mains and services.

2.2 PIPE FOR USE WITH COUPLINGS

- A. As specified above except ends shall be plain.
- B. With sleeve couplings, ends cast or machined at right angles to axis.
- C. With grooved type coupling:
 1. Ductile-iron of thickness class specified above.
 4. Grooved-end dimensions conforming to AWWA C606 for flexible joints.
 5. Grooved-end dimensions conforming to AWWA C606 for flexible or rigid joints to suit joint requirements.

2.3 FLEXIBLE JOINT PIPE

- A. Provide joints with maximum deflection of 15 degrees in any direction from pipe axis. Joint design to prevent pulling apart, and to remain watertight at any deflection angle within specified range.
- B. Provide boltless type with rubber gaskets.
- C. Pipe barrel thickness: According to manufacturer's standard but not less than ANSI Standard for pipe of corresponding class.
- D. Machine joint contact surfaces spherical, without depressions or chatter marks, or rough tool cuts.
 1. Smooth by grinding and buffing.

2. Machining accuracy. Finished pipes interchangeable without loss of watertightness or flexibility.
3. Protect spherical spigot and plain ends of cut lengths by fastened wood lagging.

2.4 FITTINGS

- A. Fittings shall be compact ductile-iron Class 350 Mechanical Joint, conforming to ANSI Specification A21.53 (AWWA C153), latest revision, for pipe sizes 16 inches and smaller, and Class 350 standard Mechanical Joint fittings conforming to AWWA C110/ANSI A21.10, latest revision except as specified, for pipe sizes 16 inches through 24 inches, unless specifically stated otherwise in the specifications or on the drawings. Fittings shall be suitable for use with restraints as specified hereinafter. Fittings shall be manufactured in North America. Fittings shall be of the same material and have the same lining and coating as the pipe specified above. All fittings shall be marked with the weight and shall have distinctly cast upon them the pressure rating, the manufacturer's identification, nominal diameter of openings, and the number of degrees or fraction of the circle on all bends.
 1. Hydrant tees shall have a rotatable mechanical-joint gland on the 6-inch plain end branch to provide positive valve restraint, unless otherwise allowed by the Engineer.
 2. Caps and plugs installed in all new work as indicated on the drawings shall be provided with a threaded corporation or bleeder valve so that air and water pressure can be relieved prior to future connection.
- B. Provide all bell push-on or mechanical-joint fittings unless otherwise indicated or specified.
- C. Face and drill flanged fittings conforming to ANSI A21.10 except special drilling or tapping as necessary for correct alignment and bolting.
- D. If flanged fittings are not available under ANSI A21.10, provide fittings conforming to ANSI B16.1 in 125-pound pressure class.
- E. Provide standard base fittings where indicated.
- F. Provide grooved-end fittings ductile-iron conforming to ANSI A21.10 (AWWA C110) for center-to-face dimensions.
 1. End preparation for grooved-ends conforming to AWWA C606 for flexible or rigid joints as required by type of joint.
 2. End preparation for grooved-ends conforming to AWWA C606 for flexible joints.
 3. Minimum wall thickness of grooved fittings 12 inches and smaller conforming to ANSI A21.53 (AWWA C153).

4. Minimum wall thickness of grooved fittings larger than 12 inches conforming to ANSI A21.10 (AWWA C110).

2.5 NONSTANDARD FITTINGS

- A. Acceptable design.
- B. Same diameter and thickness as standard fittings.
- C. Manufactured to meet requirements of same specifications as standard fittings except for laying length and types of ends.

2.6 ADAPTERS

- A. Furnish and install for joining pipe of different types, unless solid sleeves indicated.
 1. Provide ends conforming to above specifications for appropriate type of joint, to receive adjoining pipe.
 2. Joining two classes of pipe may be of lighter class provided annular space in bell-and-spigot type joints sufficient for jointing.

2.7 JOINTS

- A. Provide mechanical-joint or push-on joint pipe with necessary accessories, conforming to ANSI A21.11.
 1. Provide gasket composition suitable for exposure to liquid within pipe.
 2. Provide gasket composition suitable for exposure to potable water.
 3. Provide mechanical-joint gaskets with copper tips to provide electrical continuity.
 4. Provide serrated brass wedges for push-on joints to provide electrical continuity; two per joint for pipe 12 inches and smaller and four per joint for larger pipe.
- B. Provide pipe flanges and accessories conforming to AWWA C115/ANSI A21.15.
 1. Provide flat faced flanges.
 2. Provide 1/8-inch-thick, full-faced gaskets suitable for exposure to liquid within pipe.
- B. Restrained joints shall be furnished for installation on all fittings, sleeves, hydrants, and valves. Restraints for mechanical joints shall be Megalug as manufactured by EBAA Iron Co., Uni-flanged Series 1400 Mechanical Joint Restraint, or equal. Restraints for push-on joints shall be Series 1390 as manufactured by Uni-Flange or Series 800 Coverall as manufactured by EBAA Iron Co.

2.8 FLEXIBLE CONNECTIONS

- A. Use as specified or indicated:
 - 1. Sleeve-type couplings
 - 2. Grooved couplings
 - 3. Mechanical-joint pipe and/or fittings

2.9 SLEEVE-TYPE COUPLINGS

- A. Pressure rating at least equal to that of related pipeline with a minimum rating of 150 psi.
- B. Sleeve-type couplings shall be of steel and shall be Style 38 by Dresser Mfg. Div., Smith-Blair, or approved equal. Couplings shall be furnished with black steel bolts and nuts and with pipe stop removed. Gaskets shall be of a material suitable for exposure to liquid within the pipe.

2.10 GROOVED COUPLINGS

- A. Conform to AWWA C606.
- B. Minimum pipe wall thickness specified under "Pipe For Use With Couplings."
- C. Where grooved couplings are indicated to provide for expansion or flexibility, cut pipe grooves to provide necessary expansion or flexibility.
- D. Where grooved couplings are used instead of flanged joints, joint to be of rigid type with pipe grooves cut to bring pipe ends together. Beam strength of joint shall be equal to or greater than that of flanged joint.

2.11 FILLING RINGS

- A. Provide where necessary.
- B. Materials, workmanship, facing, and drilling conforming to 125-pound ANSI Standard.
- C. Suitable length with nonparallel faces and corresponding drilling, if necessary, for correct assembly of adjoining piping or equipment.

2.12 CONNECTIONS – TAPPED

- A. Provide watertight joint with adequate strength against pullout. Use only tapered thread taps.
- B. Maximum size of taps in pipe or fittings without bosses not to exceed that listed in appropriate table of Appendix to AWWA C151/ANSI A21.51 based on:
 - 1. 3 full threads for gray-iron.
 - 2. 2 full threads for ductile-iron.

- C. Where size of connection exceeds that given above for pipe, provide boss on pipe barrel or use tapping saddle. Make tap in flat part of intersection of run and branch of tee or cross, or connect by means of tapped tee, branch fitting and tapped plug or reducing flange, or tapping tee and tapping valve, as indicated or permitted.

2.13 STANDARD LINING AND COATING

- A. Inside of pipe and fittings. Provide double thickness cement lining and bituminous seal coat conforming to AWWA C104/ANSI A21.4.
- B. Outside of pipe and fittings within structures. Clean and apply one shop coat of Koppers Pug Primer made by Koppers Co., Inc., Pittsburgh, PA; Chem-Prime 37-77 made by Tnemec Co., North Kansas City, MD; 13-R-50 Chromax Primer made by Valspar Corp. Short Hills, NJ; or acceptable equivalent.
- C. Outside surfaces of castings to be encased in concrete. Leave bare, do not use coating.
- D. Machined surfaces. Cleaned and coated with suitable rust-preventative compound at shop.
- E. Outside of other pipe and fittings. Standard bituminous coating conforming to appropriate ANSI Standard.

2.14 INSULATED PIPE

- A. The pipe shall be insulated where shown on the Contract Drawings and where directed. Insulation shall be a thermal barrier conduit of nonmetallic, sectional factory fabricated type. It shall be structurally strong, watertight, and entirely resistant to corrosive elements. The entire system shall be suitable for outside installation with temperature variations from -40°F to +120°F. It shall be closed cell, polyurethane foam pipe insulation with a minimum thickness of two (2) inches, and a thermal conductivity of 0.16 BTU-in/hr sq. ft °F. All ends of piping insulation shall be sealed with a factory applied moisture barrier.
- B. Materials
 - a. Carrier Pipe – as specified.
 - b. Insulation - foamed in-place closed cell polyurethane foam completely filling the annulus between the carrier pipe and jacketing.
- C. Mechanical Properties
 - a. Core Density: 2.1 P.C.F., ASTM D-1622
 - b. Closed Cell Content: 90 to 95%, ASTM D-2856
 - c. “K” Factor, BTU/hr.in/ft²/°F @ 73° F: 0.16, ASTM C-518
- D. Jacketing
 - a. HDPE: Black High Density Polyethylene
 - b. Resin Type III, Grade P34, under ASTM D-1248
 - c. Tensile Yield Strength: 3300 psi ASTM D-638
 - d. Ultimate Elongation: 850% per ASTM D-638
 - e. Tangent Flexural Modulus: 175,000 psi per ASTM D-790

- E. The piping is to have the encased insulation applied, to the degree practical, at the factory of the insulation and casing fabricator. A representative of the Manufacturer shall be available at the project site for instruction and supervision.
- F. Bedding material for the insulated pipe shall be ½-inch crushed stone.
- G. Pre-insulated piping system shall be Insul-Tek Ductile Iron System by Insulated Piping Systems, Inc. or equal.

2.15 GASKETS, BOLTS, AND NUTS

- A. Meets the material requirements of ANSI/AWWA C111 for mechanical-joint gaskets.
- B. Provide ring rubber gaskets with cloth insertion for flanged joints, neoprene-faced phenolic for insulating gaskets.
 - 1. Gaskets 12 inches in diameter and smaller, 1/16-inch thick.
 - 2. Larger than 12 inches, 1/8-inch thick.
- B. Make flanged joints with:
 - 1. Bolts.
 - 2. Bolt studs with nut on each end.
 - 3. Studs with nuts where flange is tapped.
 - 4. Plastic bolt sleeves and washers for insulating joints.
- C. Number and size of bolts conform to same ANSI as flanges.
- D. Provide bolts and nuts, except as specified or indicated, Grade B, ASTM A307.
- E. Provide bolt studs and studs of same quality as machine bolts.
- F. Flanged joints for wall castings flush with masonry made up with Type 316 stainless steel stud bolts and nuts.
- G. Submerged flanged joints made up with Type 316 stainless steel bolts and nuts.

2.16 ELECTRICAL CONDUCTORS

- A. Provide 1/16-inch by 3/4-inch copper strip conductors for joints indicated to have electrical continuity.
- B. Weld terminal strips to bell-ends and spigot ends of pipe in the foundry. Provide jumper strips and silicon bronze bolts and nuts to complete the connections.
- C. If field cutting of pipe is necessary, weld terminal strip to cut spigot end using thermit weld or other approved process.

2.17 BURIED UTILITY WARNING AND IDENTIFICATION TAPE

- A. Provide detectable aluminum foil plastic backed tape or detectable magnetic plastic tape manufactured specifically for warning and identification of buried piping. Tape shall be detectable by an electronic detection instrument. Provide tape in rolls, 3 inches minimum width, color coded for the utility involved with warning and identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification shall be CAUTION BURIED WATER PIPING BELOW or similar. Use permanent code and letter coloring unaffected by moisture and other substances contained in trench backfill material. Bury tape with the printed side up at a depth of 24 inches below the top surface of earth or the top surface of the subgrade under pavements.

PART 3 – EXECUTION

3.1 HANDLING PIPE

- A. The Contractor shall take care not to damage pipe by impact, bending, compression, or abrasion during handling and installation. Joint ends of pipe especially shall be kept clean.
- B. Pipe shall be stored above ground at a height no greater than 5 feet, and with even support for the pipe barrel.
- C. Only nylon-protected slings shall be used for handling the pipe. No hooks or bare cables will be permitted.
- D. Gaskets shall be shipped in cartons and stored in a clean area, away from grease, oil, heat, direct sunlight, and ozone-producing electric motors.

3.2 ALIGNMENT AND PLACEMENT OF PIPE

- A. The Contractor will be responsible for transporting materials to the job site as needed. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe lining or coatings. Pipe or fittings shall not be dropped. The Engineer shall examine all pipes and fittings prior to installation. Any pipe or fittings found defective shall not be installed and immediately removed from the site. Any damage to pipe linings or coatings may be repaired as directed by the Engineer, or removed from the site. Handling and installation of pipe and fittings shall be in accordance with the manufacturer's instruction and as specified herein. Any materials damaged during loading, transporting, or unloading shall be replaced at the Contractor's expense.
- B. Existing Utilities. To the extent possible, the Contractor shall maintain a minimum 10-foot lateral separation between the new water mains and existing sewers or drains, unless otherwise directed by the Engineer.
- C. New water mains shall pass under all existing utilities except sewers, unless otherwise noted on the Drawings or directed by the Engineer.
- D. The Contractor shall maintain a minimum clearance between the new water main and all other existing utilities of at least 18 inches (water line 18 inches above).

- E. Ductile-iron pipe shall be wrapped in polyethylene encasement where pipe depth is at or below normal groundwater level.
- F. Water pipe to be installed with less than 5-foot cover, or where shown on the drawings, shall be wrapped with an insulating foam jacket suitable for direct burial applications.
- G. Jointing of ductile-iron pipe and fittings shall be done in accordance with the printed recommendations of the manufacturer and as specified. The last 8 inches of the outside of the spigot end of pipe and the inside of the bell-end of pipe shall be thoroughly cleaned. The joint surfaces and the gasket shall be painted with a lubricant just prior to making up the joint. The spigot end shall then be gently pushed home into the bell. The position of the gasket shall be checked to ensure that the joint has been properly made and is watertight. Care shall be taken not to exceed the manufacturer's recommended maximum deflection allowed for each joint.
- H. Installation and jointing of push-on ductile-iron pipe shall be in accordance with AWWA C600 Sections 9b and 9c, latest revision, as applicable.
- I. Mechanical joints shall be installed with Megalug restraints. Restraints shall be installed in full accordance with the manufacturer's instructions. All bolt heads on Megalugs shall be tightened sufficiently so that they shear off to provide indication that proper tightening torque was achieved.
- J. Restrained push-on joints shall be installed with specified joint restraints. Restraints shall be installed in full accordance with the manufacturer's instructions.
- K. Insulated pipe with jacket is to be installed where shown on the drawings and on any pipe having less than 4-foot cover.
- L. Solid sleeves shall be used to join plain ends on ductile-iron pipe. Mechanical joints shall be installed with Megalug restraints, as specified hereinbefore.

3.3 INSTALLATION

- A. Pipe and Fittings:
 - 1. Remove and replace defective pieces.
 - 2. Clear of all debris and dirt before installing and keep clean until accepted.
 - 3. Lay accurately to lines and grades indicated or required. Provide accurate alignment, both horizontally and vertically.
 - 4. Provide firm bearing along entire length of buried pipelines.
- B. Temporary Plugs. When pipe laying not in progress, close open ends of pipe with temporary watertight plugs. If water in trench, do not remove plug until danger of water entering pipe passed.
- C. Socket Pipe Clamps, Tierods, and Bridles. Where indicated or necessary to prevent joints or sleeve couplings from pulling apart under pressure, provide suitable socket pipe

clamps, tierods, and bridles. Use bridles and tierods at least 3/4 inches in diameter except where they replace flange bolts of smaller size with nut on each side of flange pairs. Coat clamps and tierods or bridles with two coats of bituminous coating after assembly and allow to dry before backfilling.

D. Appurtenances. Set valves, fittings, and appurtenances as indicated.

3.4 JOINTS AND COUPLINGS

A. Conform to AWWA C111, latest revision.

B. Push-on Joints:

1. Insert gasket into groove bell. Apply thin film of nontoxic gasket lubricant over inner surface of gasket in contact with spigot end.
2. Insert chamfered end into gasket. Force pipe past it until it seats against socket bottom.

C. Bolted Joints:

1. Remove rust-preventive coatings from machined surfaces.
2. Clean pipe ends, sockets, sleeves, housings, and gaskets, and smooth all burrs and other defects.
3. Use torque wrench to tighten to correct range of torque not to exceed values specified below:

TORQUE RANGE VALUES

Nominal pipe size, in	Bolt diameter, in	Range of torque, ft-lb
3	5/8	40-60
4-24, incl.	3/4	75-90
30, 36	1	100-120
42, 48	1-1/4	120-150

D. Flanged Joint:

1. Make up tight.
2. Do not put strain on nozzles, valves, and other equipment.

E. Mechanical Joints:

1. Wire brush surfaces in contact with gasket and clean gasket.
2. Lubricate gasket, bell, and spigot with soapy water.
3. Slip gland and gasket over spigot, and insert spigot into bell until seated.
4. Seat gasket and press gland firmly against gasket.

5. After bolts inserted and nuts made finger-tight, tighten diametrically opposite nuts progressively and uniformly around joint by torque wrench. Torque bolts to values specified above.

F. Flexible Joints:

1. Clean and dry before assembly.
2. Place gaskets, rings, glands, and followers in position in back of spigot ball.
3. Coat ball and socket with thin film of lubricant conforming to joint manufacturer's standards.
4. Insert ball and seat in socket. Seat gasket against ball.
5. Boltless joints:
 - a. Assemble retainer rings and glands conforming to manufacturer's standard.
 - b. Lock in place with lead strips.

G. Sleeve-Type Coupling:

1. Clean pipe ends for distance of 8 inches.
2. Use soapy water as gasket lubricant.
3. Slip follower and gasket over each pipe to a distance of 6 inches from end and place middle ring on pipe end until centered over joint.
4. Insert other pipe end into middle ring and bring to proper position in relation to pipe laid.
5. Press gaskets and followers into middle ring flares.
6. After bolts inserted and nuts made fingertight, tighten diametrically opposite nuts by use of torque wrench of size and correct range of torque not to exceed values specified below:

TORQUE RANGE VALUES

Nominal pipe size, in	Bolt diameter, in	Range of torque, ft-lb
3-24	5/8	75
30-36 (1/2 in. mid ring)	5/8	65
30-36 (3/8 in. mid ring)	5/8	70
30-48	3/4	80
48-72	3/4	70

7. After assembly and inspection and before backfill, coat exterior surfaces of buried couplings with heavy-bodied bituminous mastic.

H. Grooved Couplings:

1. Clean grooves and other parts.
2. Coat ends of pipe and outside of gasket with soft soap or silicone and slip gasket over one pipe end.
3. Bring pipes to correct position and center gasket over pipe ends with lips against pipe.
4. Place housing sections, insert bolts, and tighten nuts until housing sections in metal-to-metal contact.
5. After assembly and inspection and before backfilling, coat exterior surfaces of buried couplings, including bolts and nuts, with heavy-bodied bituminous mastic.

I. Tapped Connection:

1. Drill and tap normal to longitudinal axis.
2. Drilled by skilled mechanics using proper tools.
3. Use only tapered threads.

J. Electrical Conductors:

1. Install pipes so terminal strips are aligned.
2. Install jumper strips and tighten bolts.

3.5 TESTING AND DISINFECTION

- A. Prior to pressure and leakage tests, the piping shall be thoroughly flushed clean of all dirt, dust, oil, grease, and other foreign materials. This work shall be done with care to avoid damage to lining and coatings.
- B. The Contractor shall submit a plan on the method of testing and chlorinating the mains for review. The plan shall include all equipment proposed for use during the work, or the name of the qualified testing company which will perform the work. Testing of the water main shall not begin until the Engineer has approved the Contractor's plan. All testing shall be done in the presence of the Engineer.
- C. Testing of Water Main:
 1. The Contractor, in accordance with ANSI/AWWA C600 specifications or latest revision thereof, will make all pressure and leakage tests to determine that the ductile-iron pipe is structurally safe and free of excess leakage. The Contractor shall furnish all the equipment, materials, and labor required for testing. The Contractor shall furnish, at his own expense, all the water needed for all water main testing.

2. Testing shall be done in sections of the main not to exceed a 3,000-foot maximum length. Valves shall be placed in the off position at the ends of the sections to be tested. The Contractor shall provide means to prevent water from entering other parts of the pipeline not subject to testing at all times. Contractor will ensure that air release valves and other venting devices are properly installed and placed in open position when filling pipe with water.
3. After all entrapped air has been removed from the section; fill the main to the normal static pressure. The Contractor is allowed to let the main rest for up to 48 hours with static pressure. Using a special pressure pump, the Contractor shall raise the pressure to 200 pounds per square inch for 10 minutes. The pump will then be shut off and separated from the test section by a globe valve. A fluid filled pressure gage, with a maximum reading of 250 psi, shall have been placed beyond the globe valve. The test section will then be monitored for a 2-hour period. Pressure testing shall be witnessed by the Engineer.
4. This pressure shall be maintained, within 5 psi, for a minimum of 2 hours during which time the line checked for leaks by the Engineer. Based on an average test pressure of 150 psi, the measured rate of water leakage shall not exceed the following rates in the section under test:

$$L = \frac{12.25SD}{133,200}$$

Where:

L = Allowable leakage, gallons per hour

S = Length of pipe section tested, feet

D = Nominal pipe diameter, inches

5. Should leakage exceed this rate, the Contractor shall immediately locate the leak or leaks and repair same at his expense. Pipe shall be flushed and chlorinated when leakage does not exceed above standard. Approval does not absolve the Contractor from his responsibility if leaks develop within the new main or water services (to curb box) later within the warranty period.

D. Chlorinating and Flushing:

1. The Contractor, in accordance with the latest edition of ANSI/AWWA C651 Standard for Disinfecting Water Mains, shall chlorinate and flush the new water main. Chlorinated water to be flushed from the pipeline shall be de-chlorinated as shown on detail drawings or as approved by the Engineer. It shall then be discharged to the nearest storm drain. Chlorinated water shall not be discharged to any natural water body.
2. Prior to chlorination, the Contractor shall properly flush the water mains. In general, flushing shall be performed at a flow rate required to achieve a minimum velocity of 2.5 feet per second, which is approximately 400 GPM in an 8-inch diameter main, 600 GPM in a 10-inch main, 900 GPM in a 12-inch main and 1,600 GPM in a 16-inch main. Flushing of the water main, at the above rates, for approximately 20 minutes per 1,000-foot section, will allow for three volume

changes. This is a sufficient period of time for successfully cleaning the water main.

3. The Contractor shall chlorinate the water main until the main contains a solution containing 25 mg/L available chlorine. The valves shall then be closed and the chlorinated water allowed to sit in the mains for 24 hours. The main will then be checked to assure the chlorine residual shall be at least 10 mg/L. If less than 10 mg/L is measured, the Contractor shall flush and re-chlorinate the mains at no cost to the Owner. All valves and hydrants shall be operated to insure their proper disinfection. Valves shall be operated to prevent super chlorinated water from entering the existing distribution system. The Contractor shall then flush the mains until clear, clean water is being discharged.
4. Twenty-four hours after the main has been flushed of chlorinated water, bacteriological samples (total coliforms and heterotrophic plate count) shall be taken. Water samples shall be taken from corporation stops along the length of the water main as designated by the Engineer. A minimum of two (2) samples shall be taken on each street, or two per 3,000 feet of pipe, whichever is greater. Each sample shall be taken in duplicate, in sterile bottles and sent to a State approved private laboratory for analysis. The Contractor shall perform all necessary work including delivery of samples to a certified laboratory, and shall include the cost for sampling and analysis in his bid price. The results of the tests on these samples will determine the acceptance of the work and allow these new mains to be connected to the Town's system. The failure of any sample to pass the laboratory tests shall require the Contractor to re-flush and re-chlorinate the mains and resample and test the water until acceptable results are obtained, all at no additional cost to the Owner.
5. If, during construction, trench water has entered the main, or if in the opinion of the Owner's Engineer, excessive quantities of dirt or debris have entered the main, bacteriological samples shall be taken at 200-foot intervals and shall be identified as to location. Additional sample taps shall be installed and removed at the Contractor's expense.
6. Contractor shall note that work under this Contract shall not be considered complete until the satisfactory installation and testing of the water mains have been completed.

3.6 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700 - Contract Closeout.

END OF SECTION 02616

SECTION 02640

FIRE HYDRANTS, VALVES, AND APPURTENANCES

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. The work covered under this section includes the furnishing of all plant, labor, equipment, appurtenances, and materials, and in performing all operations in connection with installing and testing of the fire hydrants, valves, and appurtenances, at the locations indicated and/or as directed, complete in place in accordance with the drawings and specifications.
- B. Where existing gate boxes and hydrants are to be removed, the Contractor is responsible for disposal.

1.2 RELATED WORK

- A. Section 02200 – Earthwork
- B. Section 02616 – Ductile-Iron Pipe and Fittings

1.3 SUBMITTALS

- A. Shop Drawings. Submit the following in accordance with Section 01300 – Submittals:
 - 1. Submit shop drawings and descriptive literature, showing hydrant and valve dimensions and other details for each type and class of valve to be furnished.

1.4 REFERENCE STANDARDS

- A. American Water Works Association (AWWA)
 - 1. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 2. AWWA C500 - Gate Valves for Water and Sewerage System.
 - 3. AWWA C502 - Dry-Barrel Fire Hydrants
 - 4. AWWA C504 - Standard for Rubber-Seated Butterfly Valves.
 - 5. AWWA C509-09 - Resilient-Seated Gate Valves for Water Supply Service
- B. Underwriters Laboratory (UL)
- C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 – PRODUCTS

2.1 VALVES AND BOXES

- A. One (1) 6-inch Mueller gate valve will be furnished by the Owner for use at the new hydrant. The Contractor shall obtain the valve from the Water Department at 246 South Street in Waltham.
- B. If additional valves are needed, gate valves shall be resilient wedge seated valves meeting the latest edition of AWWA C509 (Mueller Co. 2360 series or approved equal). Valve shall have corrosion resistant fusion-bonded interior and exterior coatings. Valves are to have double O ring seals, a non-rising stem, 2-inch operating nut, and be OPEN RIGHT (clockwise to open). An arrow indicating the opening position shall be cast into the operating nut.
- C. Tapping sleeves and valves shall have resilient wedge gate valves as specified above with the following exceptions. Tapping sleeve shall be Mueller Co. Stainless Steel Tapping Sleeve Model H-304SS. Sleeves shall meet ANSI/NSF 61 standards. Sleeve outlet shall have a ¾-inch testing port with a ¾-inch NPT brass test plug. Tapping valves shall be resilient gate valves as specified above with the following exceptions. Tapping valves shall be full port opening and have flanged-by-mechanical-joint ends.
- D. Castings shall be ductile-iron and hardware shall be stainless steel.
- E. Valve boxes shall be cast iron, asphalt-coated, sliding-type, adjustable, together with cast iron covers with the word "WATER" plainly cast in relief on the top surface. A minimum 6-inch overlap is required between sliding sections. The inside diameter of the bottom section shall be at least 5-¼ inches and shall have a belled base. The top section shall be at least 6-1/8 inches and have top flanges. The bottom section shall be at least 36 inches in length. The top section shall be at least 26 inches in length and have a plain bottom.
- F. Gate boxes to be sliding-type #664 cast iron, round top and open base, top section to be 26 inches or more overall, bottom section to be 36 inches or more overall.

2.3 FIRE HYDRANTS

- A. One (1) American Darling B62B-5 fire hydrant shall be furnished by the Owner. The Contractor shall obtain the hydrant from the Water Department at 246 South Street.
- B. The hydrants shall have mechanical joint shoes, 5-foot 6-inch bury or as required to meet existing grade, and marked with an arrow and the word "open" to indicate the direction to turn the stem to open the hydrant. Hydrants shall OPEN RIGHT (clockwise to open) with 1-¾-inch over-sized operating nut.
- C. The hydrants are to receive two coats of prime paint before shipment and once installed are to be cleaned and painted by the Contractor. Hydrants shall be painted in accordance with the Waltham Water Department requirements.
- D. Hydrants shall be American Darling B-62-B, conforming to AWWA C502 (Dry Barrel Hydrants) and painted black body (P68205) and reflector white bonnets and yellow caps (P68218). Anchor tees shall be used for all new installations.
- E. Contractor shall supply and install reinforced fiberglass shaft heavy duty spring mounted hydrant markers which are 4 feet long with 3/8-inch diameter. One bolt mounting.

PART 3 – EXECUTION

3.1 INSPECTION AND PREPARATION

- A. All fire hydrants, valves, and appurtenances shall be installed in the location shown on the drawings or where directed by the Engineer. Valves shall be true to alignment and rigidly supported. Any damaged items shall be replaced before they are installed.
- B. During installation of all hydrants, valves, and appurtenances, the Contractor shall verify that all the items are clean, free from defects in materials and workmanship, and functioning properly. Valves and other equipment which do not operate easily, or are otherwise defective, shall be repaired or replaced.
- C. All valves shall be closed and kept closed until otherwise directed by the Engineer. All hydrants shall be covered with a burlap bag until put into service.
- D. Care shall be taken to avoid freezing of water in valves or hydrants.

3.2 FIELD TESTS AND ADJUSTMENTS

- A. Conduct a functional field test of each valve, including actuators and valve control equipment, if any, in the presence of the Engineer to demonstrate that each part and all components together function correctly. The Contractor shall provide all testing equipment.

3.3 MANUFACTURER'S SERVICE

- A. The Contractor shall coordinate the services of a qualified representative of the insertion/tapping equipment and/or insertion/tapping valve supplier to provide on-site support and assistance during wet tapping operations of the existing water mains as indicated on the Drawings.

3.4 SHOP PAINTING VALVES AND APPURTENANCES

- A. Interior and exterior surfaces of all valves which are not factory epoxy coated, and not specified elsewhere, shall be given two coats of shop finish of an asphalt varnish conforming to the latest edition of AWWA C504 for Varnish Asphalt. The pipe connection openings shall be capped to prevent the entry of foreign matter prior to application.

3.5 INSTALLATION OF FIRE HYDRANTS

- A. Furnish all labor, equipment, and incidentals required for the installation of fire hydrants and valves as shown on the Drawings and/or as directed by the Engineer. Hydrants shall be installed as a complete unit, including 6-inch gate valve, where designated by the Contract Drawings with the consent of the Engineer. All hydrants shall stand plumb and shall have their nozzles parallel with, or at right angles to the curb, with the nozzle facing the curb. Hydrants shall be set to the established grade, with the centerline of the lowest nozzle 18 inches above the ground.

- B. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be 36 inches square. Felt roofing paper shall be placed around the hydrant elbow before placing concrete. CARE SHALL BE TAKEN TO ENSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS.
- C. Each hydrant shall be connected to the main with a 6-inch branch controlled by an independent 6-inch valve.
- D. When a dry-barrel hydrant is set in soil that is pervious, drainage shall be provided at the base of the hydrant by placing coarse gravel or crushed stone mixed with coarse sand from the bottom of the trench to at least six (6) inches above the drain port opening in the hydrant and to a distance of one (1) foot around the elbow.
- E. When a dry-barrel hydrant with a drain opening port is set in clay or other impervious soil, a drainage pit, two (2) feet by two (2) feet by two (2) feet, shall be excavated below each hydrant and filled with coarse gravel or crushed stone mixed with coarse sand under the elbow of the hydrant and to a level of six (6) inches above the drain port. Said installation will be to the detail shown on the Drawings.
- F. Where hydrants are to be connected to a new or existing water main, no extras shall be paid for excavating the water main and preparing same for tapping, etc. All work required for proper installation of the hydrants and valves shall be included in the bid item price.

3.6 FIELD TESTS AND ADJUSTMENTS

- A. Conduct a functional field test of each valve, including actuators and valve control equipment, if any, in the presence of the Engineer to demonstrate that each part and all components together function correctly. The Contractor shall provide all testing equipment.

3.7 INSTALLATION OF BURIED VALVES AND VALVE BOXES

- A. The Contractor shall furnish all necessary labor and equipment to excavate and expose the water main sufficiently to install valves and/or tapping valves as required by the Engineer.
- B. Valves shall be cleaned and manually operated before installation. When tapping valves are installed, it is imperative that the shell cutting is removed and discarded. Valves shall be set on a firm foundation and supported by tamping pipe-bedding material under the sides of the valve. The valve box shall be supported during backfilling and maintained in vertical alignment with the top flush with the finished grade. Buried valves and valve boxes shall be set with the stem vertically aligned in the center of the valve box. The valve box shall be set so as not to transmit loads to the valve.
- C. Where ductile-iron tapping sleeves are used, the split end flanges shall be rotated off center of the flange body to ensure the gasket seams are not aligned.
- D. Tapping valves shall be thoroughly flushed after the tapping operation has been completed.

- E. Before backfilling, all exposed portions of any bolts shall be coated with two coats of bituminous paint comparable to Bitumastic No. 50 by Koppers Co., Inc. or equal.

3.8 CONTRACT CLOSEOUT

- A. Provide in accordance with Section 01700 - Contract Closeout.

END OF SECTION 02640

SECTION 02901

MISCELLANEOUS WORK

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to do the miscellaneous work not specified in other sections but obviously necessary for the proper completion of the work as shown on the Drawings.
- B. When applicable the Contractor shall perform the work in accordance with other sections of this Specification. When no applicable specification exists the Contractor shall perform the work in accordance with the best modern practice and/or as directed by the Engineer.
- C. The work of this Section includes, but is not limited to, the following:
 - 1. Grout removal and replacement at base of the tank.
 - 2. Modifications to 8-inch PVC overflow drain pipe.
 - 3. Protection of surrounding area.
 - 4. Installing and maintaining construction warning signs.
 - 5. Cleaning up.
 - 6. Incidental work.

1.2 SUBMITTALS

- A. Air Monitoring Plan. The contractor shall submit an air monitoring plan that addresses fence line monitoring for leaks and details additional engineering control to be implemented if ambient lead levels exceed the National Ambient Air Quality Standards (NAAQS) of 1.5 ug/m³.

PART 2 – PRODUCTS

2.1 POLYVINYLCHLORIDE (PVC) PIPE

- A. Gravity Pipe and Fittings: Gravity pipe shall be Schedule 40 PVC with rubber rings.
- B. Pressure Pipe and Fittings: Polyvinylchloride (PVC) pressure pipe and fitting shall conform to ASTM 2241 for 160 psi pipe (SDR 26).

- C. Joints: Rubber rings shall conform to ASTM F477 and joints shall be design tested to the requirements of ASTM D3139.

2.2 GROUT FOR CONCRETE TANK FOUNDATION

- A. Grout shall be a polyurethane-based elastomeric sealant, as manufactured by Sika Corporation, product Sikaflex 2C NS, or approved equal.

PART 3 – EXECUTION

3.1 GROUT REMOVAL AND REPLACEMENT

- A. The Contractor shall remove and chisel all existing mastic and loose grout at the base of the tank, as directed by the Engineer, and replace with product specified in 2.2.

3.2 PROTECTION OF SURROUNDING AREA

- A. The Contractor shall provide protective materials and equipment for the protection of the existing area as directed by the Engineer at no additional cost to the Owner. Materials and equipment required may include, but not limited to impervious surfaces (tarps) to protect the existing ground surface.
- B. Any area including materials and equipment that is damaged or altered shall be restored to the existing conditions prior to the start of construction, as directed by the Engineer and at no additional cost to the Owner.

3.3 INSTALLING AND MAINTAINING CONSTRUCTION WARNING SIGNS

- A. Construction work zone traffic control shall be the contractor's responsibility. Generally, conformance with Part VI of the Manual of Uniform Traffic Control Devices (MUTCD), latest edition, "Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations", will be considered to meet this requirement.

3.4 CLEANING UP

- A. The Contractor shall remove all construction material, excess excavation, buildings, equipment and other debris remaining on the job as a result of construction operations and shall restore the site of the work to a neat and orderly condition. Any materials and sand or concrete materials shall be cleaned out of manholes and catch basins. Haybales and siltfence as well as any silt and debris retained by same shall be removed.

3.5 INCIDENTAL WORK

- A. Do all incidental work not otherwise specified, but obviously necessary for the proper completion of the Contract Documents as specified herein and as shown on the Drawings.

3.6 PROTECTION AND BRACING OF UTILITY POLES

- A. The Contractor shall be responsible for making all arrangements with the proper utility companies for the bracing and protection of all utility poles that may be damaged or endangered by the Contractors operations. Work under this item shall include the related removal and reinstallation of guy wires, or support poles whether shown on the Drawings or not.

3.7 AMBIENT AIR MONITORING

- A. For the duration of the exterior sand blasting for each of the water tanks to be painted, the Contractor shall develop and implement an air monitoring plan to detect, quantify and control airborne lead contaminated dust that may be present at the fence line of the site during the removal of existing coatings.
- B. Information gathered during the air monitoring program shall be used by the Contractor to design and implement measures to control off-site mitigation of lead contaminated dust. All information gathered shall be catalogued and maintained by the Contractor.
- C. Action levels for the implementation of additional engineering control measures to protect the general public and other off-site receptors from the releases of airborne lead contaminated dust shall be based upon the National Ambient Air Quality Standards (NAAQS) of 1.5 ug/m³ for lead. The use of any other established levels shall not be permitted.
 - 1. Air monitoring shall be performed continuously during exterior blasting at the fence line of the active work site.
 - 2. Air monitoring shall be performed at a point of maximum environmental impact.
 - 3. Air monitoring shall be performed via sample collection and laboratory analysis.
- D. Samples shall be analyzed within 24 hours of collection and submitted to the Engineer within 48 hours of collection.
- E. The Contractor shall implement additional engineering control immediately, and notify the Engineer within 2 hours, upon the receipt of monitoring results or laboratory test results indicating an ambient air concentration in excess of the NAAQS for lead.

END OF SECTION 02901

SECTION 02920

TOPSOIL

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this section consists of manufacturing, delivering, and placing 4" of topsoil on prepared subgrade areas disturbed by construction. Topsoil, as available, may be stripped, screened, stockpiled and tested for reuse. Topsoil requirements in excess of available on-site will be imported. Both sources will be placed in compliance with this section.

1.2 RELATED SECTIONS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section. Related Sections include the following:
 - 1. Section 02200 – Earthwork
 - 2. Section 02945 – Turf

1.3 SUBMITTALS

- A. In accordance with Section-01300. Submit soil analysis report for imported topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay) and include additive recommendations for lawn areas. Field methods of analysis are acceptable, but laboratory report is preferred.

1.4 PRODUCT HANDLING

- A. Do not deliver topsoil in frozen, wet, or muddy condition.

PART 2 - MATERIALS

2.1 IMPORTED TOPSOIL

- A. Friable loam, typical of fertile local topsoil; free-from pure clay, weeds, noxious weed seeds, sod, clods and stones larger than 1 inch, toxic substances, litter, or other deleterious material; having a mildly alkaline to medium acid pH between 6.0 and 7.5. Soluble salts shall not exceed 4 milli-mhos per centimeter.
- B. Soil Texture: 20 to 40% fines (silt and clay fraction passing the 200 sieve) and 60 to 80% Sand and gravel. The maximum particle size shall be 1-inch.
- C. Organic Content: 5 to 10%

- D. Additives: As required by soil analysis of Topsoil for lawn areas.

PART 3 - EXECUTION

3.1 PLACING TOPSOIL

- A. Scarify compacted subgrade to a 2-inch depth to bond topsoil to subsoil. Place topsoil to a minimum depth of 4 inches for disturbed areas and areas indicated on the Drawings. Spread evenly and grade to elevations and slopes shown. Hand rake areas inaccessible to machine grading. Use all available on-site stockpiled topsoil and supplement with off-site topsoil as required, including amendments.

END OF SECTION

SECTION 02945

TURF

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section consists of providing all labor, equipment, materials, incidental work, and construction methods necessary to perform all lawn installation and fine grading work and related items as indicated on the Contract Documents and/or as specified in this Section and includes, but is not necessarily limited to, the following:
 - 1. Seeding
 - 2. Maintenance and protection

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS and other DIVISION 1 Specification Sections, apply to this section.
- B. Examine all Contract Documents and all other Sections of the Specifications for requirements therein affecting the work of this trade.
- C. The following items of related work are specified and included in other Sections of the Specifications:
 - 1. Section 02920 – Topsoil

1.3 SUBMITTALS

- A. At least 90 days prior to the first day of the seeding season described in this Section, submit to the Engineer proof of certification of Foreman or Crew Leader as Massachusetts Certified Landscape Professional or Massachusetts Certified Horticulturist in accordance with QUALITY ASSURANCE paragraph of this Section.
- B. Submit proof of landscape contractor's experience to the Engineer in accordance with QUALITY ASSURANCE paragraph of this Section.
- C. At least 30 days prior to intended use, the Contractor shall provide the following samples and submittals for approval in conformance with the requirements of Division 1 Section, SUBMITTALS. Do not order materials until Engineer's approval of samples, certifications or test results has been obtained. Delivered materials shall closely match the approved samples. Acceptance shall not constitute final acceptance. The Engineer reserves the right to reject on or after delivery any material that does not meet these Specifications.

1. Material Sampling and Testing of Loam Borrow from On-Site or Off-Site Sources shall be as specified in Section 02920, TOPSOIL (Outside Disturbed Areas).
 2. Fertilizer:
 - a. Submit product literature of seeding fertilizer and certificates showing composition and analysis.
 - b. Submit the purchasing receipt showing the total quantity purchased for the project prior to installation.
 3. Seed: Submit a manufacturer's Certificate of Compliance to the Specifications with each shipment of each type of seed. These certificates shall include the guaranteed percentages of purity, weed content and germination of the seed, and also the net weight and date of shipment. No seed may be sown until the Contractor has submitted the certificates.
 4. Hydroseeding: Prior to the start of hydroseeding, submit a certified statement for approval as to the number of pounds of materials to be used per 100 gallons of water.
 5. Wood Cellulose Fiber Mulch: Submit 4 copies of manufacturer's literature and one material sample.
 6. Limestone: Submit supplier's certification that the limestone being supplied conforms to these Specifications.
 7. All additives needed to amend a specific soil in order to meet these specifications.
- D. Maintenance Instructions: At the time of Acceptance, the Contractor shall submit complete maintenance instructions for turf care for the Owner's use. The instructions shall be reviewed for approval by the Engineer as a pre-condition for Acceptance.

1.4 EXAMINATION OF CONDITIONS

- A. All areas to be improved shall be inspected by the Contractor before starting work and any defects such as incorrect grading, or drainage problems shall be reported to the Engineer prior to beginning this work.
- B. The Contractor shall be solely responsible for judging the full extent of work requirements involved.

1.5 QUALITY ASSURANCE

- A. Qualification of Landscape Contractor: The work of this section shall be performed by a landscape contracting firm which has successfully installed work of a similar

quality, schedule requirement, and construction detailing with a minimum of five years experience. Proof of this experience shall be submitted.

- B. Qualification of Foreman or Crew Leader: All work of seeding shall be supervised by a foreman or crew leader who is a certified landscape professional or a certified horticulturist.
 - 1. Landscape professional shall be a Massachusetts Certified Landscape Professional certified by the Associated Landscape Contractors of Massachusetts.
 - 2. Horticulturist shall be a Massachusetts Certified Horticulturist as certified by the Massachusetts Nursery and Landscape Association.
 - 3. Certification shall be current. Proof of certification shall be submitted.
- C. The ratio of laborers to certified landscape professionals or certified horticulturist shall not exceed twelve to one. Certified Landscape Professional or Certified Horticulturist shall be on the project site throughout the day to day performance of the work.

PART 2 - PRODUCTS

2.1 LOAM

- A. Loam borrow shall be provided as specified in Section 02920, TOPSOIL.

2.2 SEED

- A. Seed mixture shall be fresh, clean, new crop seed. Grass shall be of the previous year's crop and in no case shall the weed seed content exceed 0.25% by weight. The seed shall be furnished and delivered in the proportion specified below in new, clean, sealed and properly labeled containers. All seed shall comply with State and Federal seed laws. Submit manufacturer's Certificates of Compliance. Seed that has become wet, moldy or otherwise damaged shall not be acceptable. Tall fescue and rygrass shall contain *Acromonium* endophytes. Seed containing endophyte must be kept cool and dry at all times; do not stockpile in the sun.

- 1. Seed Mixture Composition for disturbed areas:

<u>Common Name</u>	<u>Proportion By Weight</u>	<u>Germination Minimum</u>	<u>Purity Minimum</u>
Tall Fescue (3 varieties minimum)	80%	85%	95%
Kentucky Bluegrass	10%	85%	95%

Perennial Rye	10%	90%	95%
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- a. All grass varieties shall be within the top 50 percent of varieties tested in National Turfgrass Evaluation Program, or currently recommended as low maintenance varieties by University of Massachusetts or the University of Rhode Island.
- b. Seeding rate shall be 6 pounds per 1,000 square feet.

B. Seed may be mixed by an approved method on the site or may be mixed by a dealer. If the seed is mixed on the site, each variety shall be delivered in the original containers that shall bear the dealer's guaranteed analysis. If seed is mixed by a dealer then the Contractor shall furnish the Engineer the dealer's guaranteed statement of the composition of the mixture.

2.4 FERTILIZERS

A. Fertilizer shall be a commercial product complying with the State and United States fertilizer laws. Deliver to the site in the original unopened containers that shall bear the manufacturer's certificate of compliance covering analysis. Fertilizer shall contain not less than the percentages of weight of ingredients as recommended by the soil analysis specified, performed in Section 02920 TOPSOIL.

2.5 LIMESTONE

A. Ground limestone for adjustment of loam borrow pH shall contain not less than 85 percent of total carbonates and shall be ground to such fineness that 40 percent will pass through 100 mesh sieve and 95 percent will pass through a 20 mesh sieve. Contractor shall be aware of loam borrow pH and the amount of lime needed to adjust pH to specification in accordance with testing lab recommendations.

2.6 WOOD CELLULOSE FIBER MULCH

- A. Mulch to cover hydroseeded areas with slopes less than 3 to 1 shall be fiber processed from whole wood chips and clean recycled newsprint in a 1:1 proportion manufactured specifically for standard hydraulic mulching equipment. Fiber shall not be produced from recycled material such as sawdust, paper, or cardboard.
- B. Moisture content shall not exceed 10 percent, plus or minus 3 percent as defined by the pulp and paper industry standards. Fiber shall have a water holding capacity of not less than 900 grams water per 100 grams fiber.
- C. The mulch shall be of such character that the fiber will be dispersed into a uniform slurry when mixed with water. It shall be nontoxic to plant life or animal life.
- D. The mulch shall contain a non-petroleum based organic tackifier and a green dye to allow for easy visual metering during application but shall be non-injurious to plant growth.

2.7 HERBICIDES, CHEMICALS AND INSECTICIDES

- A. Provide chemicals and insecticides as needed for fungus or pest control. All chemicals and insecticides shall be approved by the Massachusetts Department of Food and Agriculture for the intended uses and application rates.
- B. Provide post-emergent crab grass control throughout the maintenance period to ensure a germinated and mown lawn free of crab grass.

2.8 WATER

- A. The Contractor may use water provided by the City upon request and approval of the DPW, if available. The Contractor shall be responsible to furnish his own supply of water to the site at no additional cost to the Owner if City water is not available, the Contractor shall be responsible to furnish adequate supplies at his own cost. All work injured or damaged due to the lack of water or use of too much water, shall be the Contractor's responsibility to correct. Water shall be free from impurities injurious to vegetation. The Contractor's use of Town water shall be at his own risk.

PART 3 - EXECUTION

3.1 FILLING AND COMPACTION

- A. Filling and compaction of loam shall be as described in Section 02920 TOPSOIL.

3.2 FINE GRADING

- A. Fine grading shall be as specified in Section 02200 Earthwork.

3.3 SEEDING

- A. Contractor shall obtain Engineer's written approval of fine grading and bed preparation before doing any seeding.
- B. Limit of proposed grading shall be limit of seeding unless otherwise indicated on the Contract Documents. All lawn areas disturbed outside the limit of seeding shall be prepared and seeded as specified herein at no additional cost.
- C. The season for seeding shall be from April 1 to May 31 and from August 15 to September 30. The actual planting of seed shall be done, however, only during periods within this season which are normal for such work as determined by weather conditions and by accepted practice in this locality. To prevent loss of soil via water and wind erosion and to prevent the flow of sediment, fertilizer, and pesticides onto roadways, sidewalks, and into catch basins, seed loam areas within 5 Days of spreading the loam.
- D. Seed only when the bed is in a friable condition, not muddy or hard.

- E. Seeding of Disturbed areas shall be by Hydroseeding Method specified as follows:
1. Prior to the start of work, furnish a certified statement as to the number of pounds of materials to be used per 100 gallons of water. This statement shall also specify the number of square feet of hydroseeding that can be covered with the quantity of solution in the hydroseeder.
 2. Hydroseed with wood cellulose fiber mulch at a rate as designated above in Part 2 – PRODUCTS.
 3. For the hydroseeding process, a mobile tank with a capacity of at least 500 gallons shall be filled with water and the mixture noted above in the specified proportions. The resulting slurry shall be thoroughly mixed by means of positive agitation in the tank. Apply the slurry by a centrifugal pump using the hose application techniques from the mobile tank. Only hose application shall be permitted. At no time shall the mobile tank or tank truck be allowed onto the prepared hydroseed beds. The hose shall be equipped with a nozzle of a proper design to ensure even distribution of the hydroseeding slurry over the area to be hydroseeded and shall be operated by a person thoroughly familiar with this type of seeding operation.
 4. Contractor shall obtain Engineer's written approval of fine grading and bed preparation before doing any hydroseeding.
 5. Limit of work shall be limit of hydroseeding unless otherwise indicated on the Contract Documents. All grass areas disturbed outside the limit of hydroseeding shall be hydroseeded.
 6. Seed only when the bed is in a friable condition, not muddy or hard. Construction methods shall conform to hydraulic method requirements specified in the Standard Specification.
 7. Hydroseeding shall be a two-step process.
 - a. Step one shall consist of spreading 100 percent of the required seed uniformly over the prepared loam bed so that the seed comes into direct contact with the soil. To mark the progress of the hydroseeding operation the Contractor may add 10 percent of the wood cellulose fiber mulch to the slurry.
 - b. Step two shall consist of a separate application of wood cellulose fiber mulch immediately following the first step of hydroseeding noted above. Apply the wood cellulose fiber mulch at a rate of 2,000 pounds per acre.

3.4 TURF MAINTENANCE

- A. Maintenance shall begin immediately after any area is seeded or sodded and shall continue for a 60 day active growing period for seeded areas or until Final Acceptance, whichever is longer following the completion of all turf construction work, and until final acceptance of the project. In the event that seeding operations are completed too late in the Fall for adequate germination and growth of grass, then maintenance shall continue into the following Spring for the minimum 60 Day period and including the One (1) Year Maintenance Period.
- B. Maintenance shall include re-seeding, two (2) mowings, watering, weeding, fertilizing a minimum of two times in addition to the fertilizer incorporated by harrowing into the spread loam, and resetting and straightening of protective barriers. Lawn work maintenance shall also include chemical treatments as required for fungus and/or pest control.
- C. During the maintenance period, any decline in the condition of turf areas shall require immediate action to identify potential problems and to undertake corrective measures.
- D. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment.
 - 1. The Contractor shall provide all labor and arrange for all watering necessary to establish an acceptable lawn. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary to maintain moist soil to a depth of at least two (2) inches for seeded areas and four (4) inches for sodded areas. At no time shall a tank truck be allowed on the reseeded/re-sodded beds.
 - 2. Watering shall be done in a manner that will provide uniform coverage, prevent erosion due to application of excessive quantities over small areas, and prevent damage to the finished surface by the watering equipment. The Contractor shall furnish sufficient watering equipment to apply water to the required soil depths each 8-hour period.
- E. After the grass in seeded areas has germinated, reseed all areas and parts of areas that fail to show a uniform stand of grass. Reseed such areas and parts of areas repeatedly until all areas are covered with a satisfactory growth of grass with no less than 20 grass shoots per square inch and 2880 grass shoots per square foot. Reseeding together with necessary grading, fertilizing, and trimming shall be done at the Contractor's expense.
- F. Mowing and Edging:
 - 1. The Contractor shall keep lawn areas mowed until Acceptance of the contract by cutting to a height of two (2) inches when growth reaches three (3) inches or as directed by the Engineer.

2. Remove and discard from paved areas only clippings and debris generated by each mowing and edging operation legally off-site. Engineer, if practical and aesthetic, may allow sweeping (not blowing) clippings back into grass. Mowers shall be equipped with mulching blades. Do not remove from grass areas any clippings that have been generated by mowing operations. Do not mow grass when wet.
- G. Fertilizing for seeded lawns: The first application of fertilizer is specified in Section 02920, TOPSOIL. A second application of fertilizer shall be applied to seeded areas at the time of the first mowing. This second application shall be applied at a rate that ensures that one-half pound of nitrogen is applied per 1,000 square feet. Phosphorus and potassium shall be applied proportionally in accordance with the recommendations of the soil tests and the quantities previously integrated into the soil during the first application. A third application of nitrogen fertilizer shall be applied to seeded areas approximately two months after the second application. This third application shall correspond to the following application rates dependent upon the month of application.
1. May 1-15: Apply 1.0 pound of nitrogen per 1,000 square feet.
 2. June 15-30: Apply 1.0 pound of nitrogen per 1,000 square feet.
 3. August 15 through September 15: Apply 1.0 pound of nitrogen per 1,000 square feet.
 4. November 1-15: Apply 1.5 pounds of nitrogen per 1,000 square feet.

**Nitrogen fertilizer shall be composed of 50 percent slowly soluble or slow release nitrogen fertilizer.

3.5 APPLYING LIMESTONE

- A. The Contractor shall return to the site at the beginning of the next seeding season as specified above and spread limestone across all lawn areas installed under this Contract. Limestone shall be spread at rates determined by the soil tests specified.

3.6 ACCEPTANCE

- A. Following the minimum required maintenance periods for lawn construction, the Contractor shall request the Engineer in writing for a formal inspection of the completed work. Request for inspection shall be received by the Engineer at least 10 Days before anticipated date of inspection.
- B. Acceptance Requirements:
1. At the end of the maintenance period, seeded areas shall have a close stand of grass as defined above with no weeds present and no bare spots greater than 3 inches in diameter over greater than 5 percent of the overall seeded area. At

least 90 percent of the grass established shall be permanent grass species. If seeded areas are deficient, the Contractor's responsibility for maintenance of all seeded areas shall be extended until deficiencies are corrected. Seeded areas to be corrected shall be prepared and reseeded in accordance with the requirements of this specification.

- C. Furnish full and complete written instructions for maintenance of the lawns to the Owner at the time of acceptance in conformance with Submittals requirements.
- D. Engineer's inspection shall determine whether maintenance shall continue in any part.

3.7 CLEAN UP

- A. Absolutely no debris may be left on the site. Excavated material shall be removed as directed. Repair any damage to site or structures to restore them to their original condition, as directed by the Engineer, at no cost to the Owner.

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DIVISION 9 – FINISHES

09960 Coating Systems for Water Storage Tanks

SECTION 09960

COATING SYSTEMS FOR WATER STORAGE TANKS

PART I - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division I Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section specifies the preparation of surfaces and furnishing and application of paint to the interior and exterior surfaces and appurtenances of the steel water storage tank.
- B. Disinfection and testing of interior surfaces prior to use for potable water shall also be provided under this section.

1.3 REFERENCE STANDARDS

- A. The latest edition of the following standards and specifications shall be used with regard to materials, design, construction, inspection, and testing to the extent specified herein:
 - 1. ANSI/NSF 61 - Drinking Water System Components - Health Effects.
 - 2. ASTM D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products.
 - 3. ASTM F 1869 - Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 4. AWWA C 652 - Disinfection of Water-Storage Facilities.
 - 5. AWWA D 102 - Coating Steel Water Storage Tanks.
 - 6. SSPC-SP 1 - Solvent Cleaning.
 - 7. SSPC-SP 2 - Hand Tool Cleaning.
 - 8. SSPC-SP 3 - Power Tool Cleaning.
 - 9. SSPC-SP 6/NACE 3 - Commercial Blast Cleaning.
 - 10. SSPC-SP 7 – Brush-Off Blast Cleaning.

11. SSPC-SP 10/NACE 2 - Near-White Metal Blast Cleaning.
12. SSPC-SP 11 - Power Tool Cleaning to Bare Metal.
13. SSPC-SP 12 – Water Jetting Prior to Recoating
14. SSPC-PA 1 – Painting Application Specification.
15. SSPC-PA 3 – Painting Application Guide for Safety in Paint Application.
16. SSPC Vis-1 - Pictorial Surface Preparation Standards for Painting Steel Structures.

1.4 DEFINITIONS

- A. Definitions of Painting Terms: ASTM D 16, unless otherwise specified.
- B. Dry Film Thickness (DFT): Thickness of a coat of paint in fully cured state measured in mils (1/1000 inch).

1.5 QUALITY ASSURANCE

- A. No contractor shall be considered qualified unless it has at least 5 years' experience in the field of water tank cleaning and has a minimum of 8 tank painting projects of similar size and complexity in New England, as determined by the Engineer. Contractor shall provide references and experience description upon request of the Engineer.
- B. The Contractor shall be a qualified rigger or shall engage the services of a qualified rigger on the job at all times when rigging is being used. The foreman in charge shall have all rigging inspected by the rigger prior to use.
- C. The Contractor shall abide by all local, state, and federal laws for confined space entry.
- D. All colors, unless specified herein, shall be selected by the Owner. The color selected will not necessarily conform to the manufacturer's color chart and any tinting required shall be done by the paint manufacturer to conform to the approved sample.
- E. Only non-lead-based pigmentation shall be allowed for both interior and exterior primers and topcoats.

1.6 SUBMITTALS

- A. Shop Drawings: Submit the following in accordance with Section 01300 - "Submittals":
1. Product Data: Submit manufacturer's product data for each coating, including generic description, product line number, complete technical data, surface preparation, and application instructions.
 2. Product Data: Submit technical data sheets for each coating, giving descriptive data. Curing times, mixing, thinning, and application requirements.
 - a. Provide material analysis, including vehicle type and percentage by weight and by volume of vehicle, resin, and pigment.
 - b. Provide upon request of the Engineer, specific ASTM Performance Criteria for the submitted materials.
 3. Product Data: Submit manufacturer's Safety Data Sheets (SDS) and other safety requirements.
 4. Color Samples: Submit manufacturer's color samples showing full range of standard colors.
 - a. Submit 3 samples of each coating and color selected, showing bare, prepared surface and each successive coat.
 - b. Samples shall be submitted on hardboard or metal as appropriate to coating system (size not less than 5" x 11"). Label samples on back identifying manufacturer, product name, and color number.
 5. Manufacturer's Quality Assurance: Submit manufacturer's certification that coatings comply with specified requirements and are suitable for intended application.
 6. Applicator's Quality Assurance: Submit list of a minimum of 8 completed projects of similar size and complexity to this Work. Include for each project, including projects where the specified coating system has been successfully applied:
 - a. Project name and location.
 - b. Name of Owner.
 - c. Name of Contractor.
 - d. Name of Engineer.
 - e. Name of coating manufacturer.

- f. Approximate area of coatings applied.
 - g. Date of completion.
7. Applicator's Quality Assurance: Provide certification that specialized equipment as may be required by manufacturer for proper application of coating materials shall be utilized.
 8. Warranty: Submit manufacturer's standard warranty.
 9. A plan for providing adequate containment during abrasive blasting of tank exterior.
 10. A plan for providing adequate cross ventilation and containment during welding, abrasive blasting, painting, and curing of the interior of the tank.
 11. A certified test report shall be submitted indicating results from the dry film thickness and holiday tests.
 12. A plan for chlorinating method to be used shall be submitted with the calculation for the amount of chlorine to be added to the tank.
- B. Pre-Installation meetings:
1. Schedule a conference and inspection to be held on-site before field application of coating systems begins.
 2. Conference shall be attended by Contractor, Engineer, Owner's representative, coating applicators, and a representative from the coating material manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying:
1. Coating or material name.
 2. Manufacturer.
 3. Color name and number.
 4. Batch or lot number.
 5. Date of manufacture.

6. Mixing and thinning instructions.
- B. Storage:
1. Store materials in a clean dry area and within temperature range in accordance with manufacturer's instructions.
 2. Keep containers sealed until ready for use.
 3. Do not use materials beyond manufacturer's shelf-life limits.
 4. Comply with all health and fire safety regulations.
- C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Weather:
1. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with manufacturer's instructions.
 2. Surface Temperature: Minimum of 5 degrees F (3 degrees C) above dew point.
 3. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range in accordance with manufacturer's instructions.
 4. Precipitation: Do not prepare surfaces or apply coatings in rain, snow, fog, or mist.
 5. Wind: Do not spray coatings if wind velocity is above manufacturer's limit.
- B. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with AWWA D 102.
- C. Dust and Contaminants:
1. Schedule coating work to avoid excessive dust and airborne contaminants.
 2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

3. Furnish and install shrouding on the exterior of the tank to retain dust and debris, per SSPC Guide 61, Class 3 Containment with A-2 Flexible, Impermeable, and Full Seal Joint Containment, Rigid or Flexible Support Structure and Controlled Forced, Negative Filtered Air Flow. The use of automated, mechanical dust collection equipment of suitable size and CFM capability to capture and filter all exhaust dust for both the interior and exterior surface preparation procedures.

D. Dehumidification and Heating

1. The Contractor shall furnish and maintain on site a dehumidification and indirect hot-air heating system that is capable of maintaining a controlled atmosphere for the interior of the tank during the surface preparation, coating application procedures, and full cure of the interior coating system. The specified surface preparation standard (SSPC SP 10) must be maintained with the use of this equipment. While this equipment is in use, and prior to coating, should the surface preparation quality fall below the specified standard, the Contractor shall re-clean the affected surfaces, at his own expense, to the specified standard prior to coating. The Contractor shall utilize dehumidification and heating equipment to maintain minimum surface temperatures and minimum dew point requirements for the interior coating system throughout the application and cure-to-immersion service time frames, as established by the coating manufacturer.
2. The Contractor shall submit detailed information to include the manufacturer of the unit, dimensions, power requirements, flow rates, and moisture removal.
3. The Contractor shall submit a plan indicating the location of all proposed equipment.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All tank painting shall be in accordance with the latest edition of AWWA D102, the Steel Structures Painting Council Specification SSPC-PA1, approved paint manufacturer specifications, and as specified herein.
- B. Each paint system shall be from a single manufacturer. Materials specified are those that have been evaluated for the specific service. Products of the Tnemec Company, Inc. are listed to establish a standard of performance and quality. Equivalent materials of other manufacturer's may be submitted on written approval of the Engineer. Requests for substitution shall include manufacturer's literature for each product giving name, product number, generic type, descriptive information, solids by volume, recommended dry film thickness and certified lab test reports showing results to equal the performance

criteria of the products specified herein. In addition, a list of five projects shall be submitted in which each product has been used and rendered satisfactory service.

- C. All paint systems shall be environmentally (VOC) compliant in accordance with all Federal and Massachusetts regulations and the latest OTC (Ozone Transport Commission) VOC regulations.
- D. The interior paint system shall conform to Inside Coating System No. 5 as defined in AWWA D102 and shall be NSF approved.
- E. The exterior paint system shall conform to Outside Coating System No. 4 or No. 6 as defined in AWWA D102.

2.2 EXTERIOR COATING SYSTEM

- A. The exterior coating system shall be a three-coat zinc, epoxy, polyurethane, and fluoropolymer coating system applied to all exterior surfaces of the tank, including all appurtenances such as platforms, catwalks, railings, columns, overflow pipe, vent pipes, vents, frames, hatch covers, ladders, ladder safety cage, panels, cabinets, etc.
- B. Coating System for Base Bid:
 - 1. Prime coat - Tnemec, Series 94-H2O Hydro-Zinc 2.5-3.5 mils
 - 2. Intermediate coat- Tnemec, Series 27 Typoxy 2.5-3.5 mils
 - 3. Finish coat- Tnemec, Series 750 UVX 3.0-4.0 mils
- C. The finish color of the topcoat for the tank shall be selected by the Owner. Three (3) colors similar to the existing color finish of the water storage tank shall be provided for Owner selection.
- D. Furnish to the Owner 2 gallons of exterior topcoat of the same type and color used on the work.

2.3 INTERIOR COATING SYSTEM

- A. The interior coatings shall be a urethane zinc rich primer followed by a two-coat epoxy coating system applied to all interior surfaces of the tank including the floor, roof, hatches, structural support systems, tank mixing system, and other appurtenances.

B. Coating System:

Interior Shell Walls, Floor Surfaces, and Tank Mixing System:

1. Prime coat - Tnemec, Series 94-H2O Hydro-Zinc 2.5 – 3.5 mils
2. Stripe prime coat - Tnemec, Series N140 PotaPox 2.5 – 3.5 mils
3. Topcoat - Tnemec, Series FC 22 Pota-Pox 100 white 2.5-3.5 mils dft

Interior Underside of Roof Plates and Support Structure:

1. Prime coat - Tnemec, Series 94-H2O Hydro-Zinc 2.5 – 3.5 mils
2. Stripe prime coat - Tnemec, Series N140 PotaPox 2.5 – 3.5.mils
3. Full Intermediate Coat: Tnemec, Series N140 1255 Beige PotaPox 4.0 – 6.0 mils
4. Topcoat – Tnemec Series N140 PotaPox 15BL Tank White 4.0 – 6.0 mils

- C. Pit filling shall be completed with Tnemec Series 215 Surfacer or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. No paint shall be applied when the temperature of the surface to be painted is below the minimum temperature specified by the paint manufacturer, or less than 5 degrees above the dew point temperature. Paint shall not be applied to wet or damp surfaces or when the relative humidity exceeds 85%. Follow paint manufacturer's recommendations for the specific paint system used.
- B. The Contractor shall remove and legally dispose of all sediment, including the debris from the tank interior visible after the tank has been drained, prior to any coating.
- C. Before painting, remove slag, weld metal splatter, and sharp edges by chipping or grinding. All surfaces that have been welded, abraded, or otherwise damaged shall be cleaned and primed in the field in accordance with the paint system requirements.
- D. All areas blasted in the field shall be coated the same day before any rusting occurs.

- E. Take precautionary measures to prevent fire hazards and spontaneous combustions. Remove empty paint containers from site.
- F. Place cotton waste, cloths, and hazardous material in containers, and remove from site daily.
- G. Protect elements surrounding work of this section from damage or disfiguration.
- H. During application of coating materials, post 'Wet Paint' signs.
- I. During application of solvent-based materials, post 'No Smoking' signs.

3.2 EXAMINATION

- A. Site Verification of Conditions:
 - 1. Examine areas and conditions under which application of coating systems shall be performed for conditions that will adversely affect execution, permanence, or quality of coating system application.
 - 2. Correct conditions detrimental to timely and proper execution of Work.
 - 3. Do not proceed until unsatisfactory conditions have been corrected.
 - 4. Commencement of installation constitutes acceptance of conditions and responsibility for satisfactory performance.

3.3 PREPARATION

- A. All interior and exterior surfaces shall be abrasive blast cleaned in accordance with SSPC SP-10, Near-White Blast Cleaning. Entire tank exterior must be shrouded during abrasive blast cleaning.
- B. Surface preparation shall not be done simultaneously with priming. An entire area or section shall be cleaned and inspected by the Engineer before primer is applied to that area. No primer is to be applied until the entire area has been viewed by the Engineer. Any defect not properly cleaned as specified will be cause for rejection of the entire area in question and no priming shall be done on this area until satisfactory corrections are made and approved by the Engineer.
- C. The blast cleaning procedure shall use angular grit abrasive. The size and gradation shall be such as to produce a 2.0-3.0 mils angular anchor profile that is sharp and clean with no embedded spent abrasive material.

- D. The abrasive blast cleaning shall be effective in removing corrosion deposits and scale as defined in the surface preparation SSPC SP-10 specification and as shown in the visual standards SSPC Vis-1.
- E. Maintain ambient conditions prior to, during the coating application, and through full cure to immersion service for the interior painting process. The use of dehumidification and heating equipment shall be required to maintain the coating manufacturer's minimum curing conditions criteria.
- F. Surface Preparation:
 - 4. General Requirements:
 - a. Prior to application of primer, surfaces shall be prepared to receive specified coating system in compliance with manufacturer's recommendations and specifications of Steel Structures Painting Council.
 - b. Clean surfaces of residual deposits of grease, scale, rust, oil, dirt, and other foreign matter, immediately prior to priming. Surfaces to be coated shall be clean, dry, smooth, and free from dust and foreign matter which will adversely affect adhesion or appearance.
 - 2. Ferrous Metal Surfaces:
 - a. Surfaces shall be free of residual deposits of grease, rust, scale, dirt, dust, and oil.
 - b. Surfaces shall be cleaned in compliance with specifications of Steel Structures Painting Council.
- G. The Contractor shall repair all pitted areas of the tank surfaces that show loss of 35% or more of existing plate thickness and/or any areas of severe undercut or reduction of weldment below the surface of the shell plates, or as directed by the Engineer. Pitted areas of the tank surfaces that show loss of 50% or more of the existing plate thickness shall be repaired by welding method. Other pitted areas, between 35% and 50% deep, shall be repaired using epoxy filler. Pit welded areas and epoxy filled areas are to be re-cleaned and spot blasted prior to applying coating systems. Surfaces that are damaged by pit welding shall be sand blasted and spot painted to match surrounding undamaged surfaces.

3.4 APPLICATION

- A. All coatings materials shall be stored, mixed, applied, and cured within ambient temperature ranges identified by the painting manufacturer. Application and curing shall also be accomplished within the relative humidity range. Natural

ambient conditions for curing periods shall be anticipated by the Contractor and have Engineer's approval.

- B. No coating work shall be done if the ambient temperatures (air, coating materials, and substrate) are not within the allowable ranges unless the Contractor is able to control these conditions through the use of effective equipment.
- C. The coating materials shall be applied in strict accordance with the respective coating manufacturer's written recommendations.
- D. Spot field prime coat materials shall be applied to the surface after blast cleaning before any rust back occurs or before the end of each day of surface preparation effort, whichever comes first.
- E. The full intermediate prime coat shall be applied to the entire tank surface (interior and exterior). Unprimed areas, abraded areas and areas considered in an advanced state of deterioration by the Engineer shall be blast cleaned and the remaining shop primed areas shall be brush cleaned prior to application of the full intermediate prime coat.
- F. Spray guns shall be held perpendicular to the surface being coated in such a manner that all dry overspray is kept at a minimum. All spray application of coatings shall utilize a cross spray technique to maximize coverage of all irregular surfaces.
- G. All coating material for interior surfaces shall be applied by airless spray equipment of a type and size suitable for the respective material. Coating material shall be applied around rivets, welds, edges, and inside angles by use of a brush.
- H. All coating material for exterior surfaces shall be applied by brush, roller, or airless spray equipment of a type and size suitable for the respective material. Use of airless spray equipment shall be allowed only if adequate containment is provided to minimize overspray and emissions to the surrounding areas meeting the approval of the Engineer. Application of prime coat to the base and six inches up the side walls shall be by brush, as well as to all rivets, welds, edges, and inside angles to ensure proper coverage and application.
- I. After surface preparation, interior weld seams, leading edges, and nut and bolt assemblies shall be "stripe-coated" by brush method with one coat of primer. Application may be performed prior to or following the application of the full prime coat on prepared surfaces. "Stripe-coat" shall be the same as the full prime coat but be a contrasting color for inspection purposes.
- J. Make edges of paint adjoining other materials or colors sharp and clean, without overlapping.
- K. Apply coatings in accordance with manufacturer's instructions.

- L. Mix and thin coatings, including multi-component materials, in accordance with manufacturer's instructions.
- M. Keep containers closed when not in use to avoid contamination.
- N. Do not use mixed coatings beyond pot life limits.
- O. Use application equipment, tools, pressure settings, and techniques in accordance with manufacturer's instructions.
- P. Uniformly apply coatings at spreading rate required to achieve specified DFT.
- Q. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.
- R. Stripe paint with brush critical locations on steel such as welds, corners, and edges using specified primer.
- S. The exterior prime coat is the only coat that will be permitted to be sprayed. The other coats on the tank exterior must be applied by roller. Paint application methods shall be approved by the Engineer.

3.5 VENTILATION

- A. During application of coatings inside the tank, adequate ventilation shall be provided, and all equipment shall be non-sparking and explosion-proof. Necessary precautions shall be taken to ensure safe working conditions are maintained during use of paints which contain toxic and flammable solvents.
- B. Effectiveness of the ventilation system shall be checked by making periodic explosive meter readings, in which the concentration of volatile material shall not exceed 20 percent of the lower explosive limit.
- C. Continuous forced ventilation at a rate of at least one complete air change every 4 hours shall be provided for at least 48 hours after coating application is completely cured in accordance with the paint manufacturer's recommendations. Tank manholes shall be kept open for an additional 7 days. The Contractor may use heat to obtain proper curing and to ensure that the painting is completed within the project schedule.

3.6 ACCEPTANCE

- A. The bases for acceptance of the coating work are listed below. Deviations beyond these parameters shall, at the Engineer's discretion, be corrected by the Contractor at his own expense and in accordance with the manufacturer's

recommendations.

1. No runs or sags
 2. No overspray or roughness
 3. No holidays or pinholes
 4. No color or gloss variations
 5. Allowable film thickness +2.0 mils over specified thickness
- B. Wet and dry film thickness measurements shall be made for each 100 square feet of surface painted. Additional coats shall be applied as required to attain the minimum dry film thickness specified for the painting system.
- C. The paint on all interior surfaces below the overflow shall be tested with a wet sponge low-voltage holiday detector after the paint has cured for at least 5 days. The holiday testing shall be in accordance with AWWA D102. Locations where holidays are detected shall be repaired and retested.

3.7 DISINFECTION AND WATER QUALITY TESTING OF WATER CONTACT SURFACES

- A. The Contractor shall disinfect the interior surfaces of the tank within 7 days after completion of all painting (including curing time) for the tank.
- B. Do not disinfect water contact surfaces or fill water storage tanks until application of coating systems is complete, coatings have fully cured, and field quality control inspection is complete.
- C. Allow number of days in accordance with manufacturer's instructions and as directed by Engineer for full cure of coating systems on water contact surfaces before flushing, disinfecting, or filling with water.
- D. Disinfection: tank shall be disinfected according to AWWA C652 Method 2 or as approved by Engineer.
- E. Water samples shall be collected by the Contractor and tested by a Massachusetts Certified laboratory for Chlorine Residual, HPC Bacteria, Coliform Bacteria and VOC's. Test results shall be submitted to the Engineer and approved prior to placing the tank back in service.
- F. Method of disposal of highly chlorinated water shall be approved by the Engineer. Use of a reducing agent shall also be approved by the Engineer.
- G. Disinfection shall be accomplished by the use of either liquid chlorine, sodium hypochlorite solution, or calcium hypochlorite granules or tablets. These chemicals and their use shall be in compliance with AWWA standards.
- H. Before any chemical disinfection begins, the interior surfaces of the tank shall be thoroughly cleaned by use of a high-pressure water jet, sweeping, scrubbing,

or equally effective means. All water and dirt or foreign material accumulated in the cleaning operation shall be discharged from the tank or otherwise removed.

1. Following the cleaning operation, the vent screens, overflow screens, and any other screened openings shall be checked and put in satisfactory condition to prevent birds, insects, and any other contaminants from entering the tank.
 2. The following are brief descriptions of three different acceptable methods of chlorination and do not necessarily describe the requirements of each disinfection method as detailed in AWWA C652.
 - a. The tank shall be filled to the overflow level with potable water to which enough chlorine is added to provide free chlorine residual in the full tank of not less than 10 mg/L at the end of an appropriate retention time.
 - b. A solution of 200 mg/L available chlorine shall be directly applied for at least 30 minutes to the surface of all parts of the tank which would be in contact with the water when the tank is full to the overflow elevation.
 - c. Water and chlorine shall be added to the tank in amounts such that initially the solutions will contain 50 mg/L available chlorine and will fill approximately 5% of the total storage volume of the tank. This solution shall be held in each tank for at least 6 hours. The tank shall then be filled to the overflow level by flowing potable water into the highly chlorinated water and shall be held full for at least 24 hours.
- I. After the chlorination procedures are completed, and before the tank is placed in service, water from the full tank shall be sampled and tested for coliform organisms in accordance with the latest edition of Standard Methods for Examination of Water and Wastewater. Testing shall be by either the multiple tube fermentation or membrane filter technique.
- a. Each water sample shall also be tested to assure that no offensive odor exists due to chlorine reaction or excess chlorine residual.
 - b. If the water samples are negative, then the tank may be placed in service. If the samples show the presence of coliform bacteria, repeat samples shall be taken until 2 consecutive samples are negative, or the tank shall again be subject to disinfection.
 - c. Samples shall also be taken from water inflowing to the tank

and tested to determine if coliforms are present in the typical potable water source(s).

- J. After completion of the painting of the interior of the tank, the paint shall be allowed to cure a minimum of seven (7) days before filling the tank with water. The Contractor shall perform VOC Testing, to verify that the water in the tank, 24 hours after filling, does not exceed regulatory limits. If VOC test fails, tank water shall be emptied and refilled and retested, at the Contractor's expense, until test passes.

3.8 REPAIR

- A. Damaged Materials: Repair or replace damaged materials and surfaces not scheduled to be coated.
- B. Damaged Coatings: Touch-up or repair damaged coatings. Touch-up of minor damage shall be acceptable where result is not visibly different from adjacent surfaces. Recoat entire surface where touch-up result is visibly different, either in sheen, texture, or color.
- C. Coating Defects: Repair in accordance with manufacturer's instructions coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems.

3.9 CLEANING

- A. At completion of day's work, remove from site rubbish and accumulated materials.
- B. Leave storage area clean and in same condition indicated for equivalent spaces in Project.
- C. The Contractor shall at all times keep the premises free from accumulation of waste materials and rubbish caused by his employees or work. At the completion of the painting, the Contractor shall remove all tools, scaffolding, surplus materials, and rubbish from and around the tanks.

3.10 WASTE MANAGEMENT

- A. Place materials defined as hazardous or toxic waste in designated containers.
- B. Do not dispose of paints or solvents by pouring on the ground. Place in designated containers for proper disposal.
- C. Contractor shall be responsible for all costs associated with containment, sediment, and waste disposal that may result from execution of this project.

3.11 FIRST ANNIVERSARY INSPECTION:

- A. The Contractor shall perform a first anniversary inspection of the tank and make repairs to the paint system in accordance with AWWA D102.
- B. Contractor shall inspect the interior tank by means of a human licensed underwater diver. The inspection shall be documented via photographs and video recording.
- C. The Owner will schedule the inspection, notify the Contractor no less than 30 days in advance and provide suitable interior lighting and ventilation for the inspection.

END OF SECTION 09960

DIVISION 11 – EQUIPMENT

11268 Reservoir Mixing System

SECTION 11268

TANK MIXING SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Supplementary Conditions and other Division 1 Specifications Section, apply to this section.
- B. Section 13210 – Steel Tank Rehabilitation

1.2 SUMMARY

- A. Furnish and install a complete hydrodynamic mixing system including all piping and appurtenances within the tank connecting to the inlet pipe as shown on the Drawings. Appurtenances include fittings, pipe supports, expansion joints and variable orifice duckbill check valves. Mixing system shall be supplied by a single manufacturer.

1.3 SUBMITTALS

- A. Shop Drawings:
Submit the following in accordance with Section 01300- SUBMITTALS
 - 1. Submit shop drawings and descriptive literature, showing valve and manifold dimensions, configuration, materials of construction and other details for the system to be furnished.
 - 2. Provide six (6) sets of engineering installation drawings of the complete manifold piping system. Drawings shall include plan view piping arrangement, sections, and elevations as required, support bracket installation details, and all dimensions required for locating the system within the specified dimensions of the tank.
- B. Design Calculations:
Submit design calculations as follows
 - 1. Hydraulic curves for each inlet nozzle showing headloss, jet velocity, and effective open area versus flow rates of 250 gpm, 500 gpm, 1,000 gpm and 1,500 gpm.
 - 2. Hydraulic calculations showing the flow distribution among all inlet ports at 250 gpm, 500 gpm, 1,000 gpm and 1,500 gpm.
 - 3. Manifold hydraulic calculations showing the total headloss of the mixing system at 250 gpm, 500 gpm, 1000 gpm, and 1,500 gpm. Headloss shall include all minor losses and headloss of nozzles and outlet check valves.

4. Hydraulic curves for each outlet check valve showing headloss vs. flow for 500 gpm, 2,000 gpm, 3,000 gpm and 4,500 gpm.
5. Calculations showing the terminal rise height of the jets that discharge at an angle above horizontal. The terminal rise height shall be calculated assuming 10°F and 20°F colder inlet water and calculated at 250 gpm, 500 gpm, 1,000 gpm and 1,500 gpm. Calculations shall be performed for bulk water temperatures of 40°F, 60°F, and 80°F. The theory and equations used to calculate the terminal rise height shall be included.

C. Drawings:

Submit design and installation drawings as follows

1. The Contractor shall be responsible for providing engineering installation drawings of the complete manifold piping system as supplied by the manufacturer. These drawings shall include plan view piping arrangement, sections, and elevations as required, support bracket installation details, duckbill valve orientation details, and all dimensions required for locating the system within the specified dimensions of the tank.
2. Drawings shall be a minimum of 11 x 17 inches.
3. Six (6) sets of plans shall be provided to the Engineer for review and approval.
4. Two (2) sets of final fabrication and installation drawings shall be included with the shipment of the manifold piping equipment.
5. All drawings shall be stamped by a registered Professional Engineer.

D. Installation, Operation, and Maintenance Manuals

1. Within 30 days of final approval of the installation drawings, by the Engineer, provide 4 sets of the installation portion of the Installation, Operation, and Maintenance (IOM) Manuals for the applicable system. Within 30 days of final approval, by the Engineer, of the installed system provide 6 copies of the complete Installation, Operation, and Maintenance (IOM) Manual for final review and approval.
2. The manuals shall be in the following format and include the listed required information as a minimum:
 - Enclosed in a 3-ring binder with project title and system designation shown on the front cover and side binder.
 - Table of contents with separation tabs.
 - Copy of hydraulic calculations for the manifold system
 - Copy of complete set of installation plans.
 - Parts and equipment list with specification numbers for ordering replacement parts.

- Product specification sheets for duckbill valves, expansion joints, concrete anchors, and any other specialized items supplied with the system.
 - Installation guidelines for the manifold system and individual duckbill valves.
 - Operational procedures for the manifold system.
 - Guidelines for repair of system components.
 - Schedule for suggested periodic maintenance of the manifold system.
- E. NSF-61 Certifications for the materials of construction used in the Mixing System shall be provided.

1.4 QUALITY ASSURANCE

- A. Provide in accordance with Section 01400 and as specified.
- B. The mixing system furnished under this Contract shall be manufactured only in accordance with these Specifications.
- C. Submit references showing manufacturer has at least 5 years' experience manufacturing "duckbill" style elastometric valves and that the manufacturer has provided mixing systems for at least 5 projects of similar scope.
- D. The Contractor shall warrant the complete mixing system, including all piping, pipe support brackets, joint connections, expansion joints, anchors, and valves against failure under design conditions for a period of 2 years.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Provide in accordance with Section 01610 and as specified.
- B. Individual valves shall be packaged separately from the piping equipment.
- C. All flanges shall be protected by using plastic inserts or plank wood, pipe sections are to be fully supported to prevent pipe deflection or damage to fittings or connections.
- D. All equipment shall be shipped on pallets capable of fully supporting the pipe sections across their entire length. Pallets should be accessible for forklift transport or strap and hoist means without causing any load to the pipe equipment.
- E. All stainless-steel components shall be stored separately away from any carbon steel components or other materials which could stain or deface the stainless-steel finish from runoff or oxidized ferrous materials.
- F. All pipe equipment shall be covered and stored in areas free from contact with construction site sediment erosion to prevent accumulation of materials within the pipe and fittings.
- G. Valves should be protected from contact with rigid objects during handling and storage. The Contractor shall be responsible for replacing any valve or elastomer

component that is damaged after arrival on the site through installation and start-up of the system.

PART 2 – PRODUCTS

2.1 MIXING SYSTEM VALVES

- A. Check valves shall be all rubber and flow operated check type with a flanged end connection. The port area shall contour down to a duckbill, which shall allow passage of flow in one direction while preventing reverse flow. The flange and flexible duckbill sleeve shall be one piece rubber construction fabricated of NSF-61 approved elastomers with nylon reinforcement.
- B. The flange drilling shall conform to ANSI B16.1 Class 125/ANSI B16.5 Class 150 standards. The valve shall be furnished with stainless steel backup rings for installation.
- C. Company name, valve size, and serial number shall be bonded to the check valve. A single manufacturer shall supply elastomer check valves.
- D. Inlet check valves shall be Tideflex Series 35 as manufactured by Red Valve Company, Inc or approved equal. Outlet check valves shall be Waterflex Series WF-3 as manufactured by Red Valve Company, Inc or approved equal.
- E. All pipe equipment shall be covered and stored in areas free from contact with soil and sediment to prevent accumulation of materials within the pipe and fittings.
- F. Duckbill valves should be protected from contact with rigid objects during handling and storage. The contractor shall be responsible for replacing any duckbill valves or elastomer components which are damaged after arrival on site through installation and start up of the system.

2.2 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

- A. Two (2) Inches and Smaller – Pipe shall be manufactured from a PE4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350-99 with a cell classification of PE345464C. Pipe shall have a manufacturing standard of ASTM D2737 (CTS). Pipe shall be DR 9 (200psi WPR) unless otherwise specified on the plans. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipes shall be suitable for use as pressure conduits, and per AWWA C901, have nominal burst values of three (3) times the Working Pressure Rating (WPR) of the pipe. Pipe shall also have the following agency listing of NSF 14.
- B. Four (4) Inches and Larger - Pipe shall be manufactured from a PE4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350-99 with a cell classification of PE345464C. Pipe shall have a manufacturing standard of ASTM F714. Pipe O.D. sizes 4” to 24” shall

be available in steel pipe sizes (IPS) and ductile iron pipe sizes (DIPS). Pipe shall be DR 17 (100psi WPR) for pipe sizes up to 36” unless otherwise specified on the plans. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipes shall be suitable for use as pressure conduits, listed as NSF 14, and per AWWA C906 Pressure Class (PC) 100 have a nominal burst value of three and one-half (3 ½) times the Working Pressure Rating (WPR) of the pipe.

- C. Pipe fittings and flanged connections, to be joined by thermal butt-fusion, shall be of the same type, grade, and class of polyethylene compound and supplied from the same raw material supplier.
- D. Sidewall fusions for connections to outlet piping shall be performed in accordance with HDPE pipe and fitting manufacturer’s specifications. The heating irons used for sidewall fusion shall have an inside diameter equal to the outside diameter of the HDPE pipe being fused. The size of the heating iron shall be ¼ inch larger than the size of the outlet branch being fused.
- E. Field fusion welding will not be allowed unless specified or approved by the Engineer.
- F. Socket fusion, hot gas fusion, threading, solvents, and epoxies will not be used to join HDPE pipe.
- G. Butt-Fusion Fittings - Fittings shall be PE4710 HDPE, Cell Classification of PE345464C as determined by ASTM D3350-99 and approved for AWWA use. Butt-Fusion Fittings shall have a manufacturing standard of ASTM D3261. Molded & fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified in the plans. Fabricated fittings are to be manufactured using Data Loggers. Temperature, fusion pressure, and a graphic representation of the fusion cycle shall be part of the quality control records. All fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half (3 ½) times the Working Pressure Rating (WPR) of the fitting.
- H. Electrofusion Fittings - Fittings shall be PE4710 HDPE, Cell Classification of PE345464C as determined by ASTM D3350-99. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half (3 ½) times the Working Pressure Rating (WPR) of the fitting.
- I. Flanged pipe sections for mechanical joining shall be comprised of HDPE flange adapters and Stainless Steel 316 slip-on backup rings. Flange adapters shall conform to PE4710 HDPE, Cell Classification PE345464C as determined by ASTM D3350-99. Stainless Steel 316 slip-on backup rings shall conform to ASTM A351CF8M.

2.3 FLANGE GASKETS

- A. Flange gaskets shall be full-faced and shall be in accordance with ASTM D1330.
- B. Flange gasket drilling pattern shall conform to ANSI B16.1/B16.5.
- C. Flange gaskets shall be 1/16" thick for flanges up to 14" diameter. 1/8" thick for gaskets shall be provided for flanges over 14" diameter.
- D. Gasket material shall be EPDM.

2.4 FASTENERS

- A. Hex head bolts and nuts shall be stainless steel 304 conforming to ANSI/ASME B18.2.1 and ANSI/ASME B18.2.2.

2.5 PIPE SUPPORTS

- A. For flanged pipe in carbon steel tanks, the pipe supports shall be carbon steel with a stainless steel 304 U-bolt in accordance with the associated standards.
- B. The pipe supports shall consist of 4 components:
 - 1. A base plate. For all stainless-steel pipe supports, the base plate will have 4 thru holes for expansion anchors and a pipe welded to the base plate with a hex nut welded to the top of the pipe to serve as a guide for the all-thread of the top-works weldment.
 - 2. For stainless steel supports, a top-works weldment that consists of structural angle iron with predrilled holes for the U-bolt. The TMS piping shall rest on the angle iron and the U-bolt is used to retain the TMS pipe. All-thread rod shall be welded to the bottom of the angle iron and shall thread into the hex nut of the base plate weldment. The top-works weldment can be rotated into or out of the hex nut to provide height adjustability.
 - 3. U-bolt with 4 hex nuts.
 - 4. An 1/8" thick EPDM strip with a length equivalent to the circumference of the pipe. The strip shall be placed between the pipe and the angle iron and U-bolt.
- C. For steel tanks, the channel of the top-works weldment shall be field fit and modified to the required length. The channel shall then be field welded to the base plate.
- D. For steel tanks, the base plate shall be field welded to the tank floor or shell. The location of the base plate shall avoid welded joints in the floor/shell plates.
- E. Plastic insulating sleeve/washers shall be utilized to isolate dissimilar metals where required.

2.6 COATINGS

- A. Following installation of the manifold system, all carbon steel and ductile iron pipe, fittings, bolted connections, pipe supports, and appurtenances shall be coated according to the interior tank paint specification as specified by the Engineer.
- B. Surface preparation and coating procedures shall be provided by the Engineer and the coating supplier.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Installation of the manifold system shall be in accordance with the valve manufacturer printed instructions.

3.2 START UP AND TESTING

A. Start-up Flow Testing

1. Following installation of the complete manifold piping system, the Contractor shall open the upstream isolation valve to allow flow into the tank through the manifold system. The isolation valve must be opened slowly to prevent surge or over-pressurization of the manifold system. The isolation valve must be fully opened to inspect the flow characteristics of the manifold system.
2. The Contractor shall visually inspect (in the presence of the Engineer) the entire piping system for leakage.
3. The Contractor shall visually inspect (in the presence of the Engineer) all of the inlet valves to ensure flow is being discharged into the tank through all valves.
4. Contractor shall repair or replace all defective components or welds at no additional cost to the Owner.

B. Warranty

1. The complete manifold piping system shall be supplied by the valve manufacturer to maintain single source responsibility for the system. The complete system shall be defined as all piping and appurtenances within the tank downstream of the tank penetration. Appurtenances include pipe, fittings, horizontal and vertical pipe supports, expansion joints, duckbill valves, and any other equipment specified within this section of the specifications.
2. All piping, pipe support brackets, joint connections, expansion joints, and anchors shall be warranted by the valve manufacturer against failure under

design conditions for a period on one (1) year from the date of final installation approval by the Engineer.

3. All valves shall be warranted by the manufacturer against failure under design operating conditions for a period of one (1) year from the date of final installation approval by the Engineer.

END OF SECTION 11268

DIVISION 13 – SPECIAL CONSTRUCTION

13210 Steel Tank Rehabilitation

SECTION 13210

STEEL TANK REHABILITATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section pertains to the replacement of select structural components and appurtenances for the steel tank rehabilitation.
- B. Steel Tank Rehabilitation work also includes repairs to the tank, regrouting and sealing concrete foundation, modifications to overflow piping, addition of a sample tap system and enclosure, and modifications to the valve vault associated with the water storage tank.
- C. Prior to perform rehabilitation work, Contractor shall remove and temporarily relocate existing antennas and maintain operations of the antennas throughout the project. New communication cable and conduit shall be installed on the rehabilitated tank and antennas shall be re-mounted.

1.2 SUBMITTALS

- A. Product Data: Include rated capacities, accessories, appurtenances, and furnished specialties for all tank rehabilitation items.
- B. Shop Drawings: Signed and sealed by a Professional Engineer registered in the State of Massachusetts. Show fabrication and installation details for all tank rehabilitation items, including the following:
 - 1. Plans, elevations, sections, details, and attachments to other work.
 - 2. Where applicable, structural analysis data signed and sealed by the Professional Engineer registered in the State of Massachusetts responsible for their preparation.
- C. Welding certificates.
- D. See Section 01300 - Submittals for other contract submittal requirements.

1.3 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code-Steel."
 - 2. AWS D1.3, "Structural Welding Code-Sheet Steel."

1.4 GUARANTEE

- A. The Contractor shall guarantee the work against defective materials or workmanship for a period of one (1) year from the date of completion. If any materials or workmanship prove to be defective within one (1) year, they shall be replaced or repaired by the Contractor at the Contractor's expense.

1.5 WORK SCHEDULE

- A. Within ten (10) days of notification of award of the contract, the Contractor shall submit to the Owner a detailed schedule showing dates when each work task is planned to begin and end.
- B. The Contractor shall attend a pre-construction conference with representatives of the Owner prior to the start of any work on the tank.

1.6 CONSTRUCTION METHODS, MEANS AND SAFETY

- A. The Contractor shall be responsible for all construction methods and means.
- B. The Contractor shall be responsible for safety at the job site and shall comply with OSHA and Massachusetts State requirements for scaffolding, rigging, other means of access, and protection of contractor personnel and authorized representatives of the Owner when at the site.

1.7 SERVICES PROVIDED BY THE OWNER

- A. The Owner will provide to the Contractor, without charge, the following temporary service during the construction period.
 - 1. Water for construction operations.

1.8 TEMPORARY FACILITIES PROVIDED BY THE CONTRACTOR

- A. Temporary Light and Power
 - 1. Furnish temporary light and power, complete with wiring, lamps and similar equipment as required to adequately light all work areas and with sufficient power capacity to meet the reasonable needs of all subcontractors. Make all necessary arrangements with the local electric company for temporary electric service, if required, and pay all expenses in connection therewith.
- B. Furnish all necessary tools, compressed air, and hoses for water hook-ups at the location on the site where the water will be made available by the Owner.

PART 2 - PRODUCTS

2.1 COATING SYSTEMS

- A. New coating systems will be applied to the tank exterior and interior surfaces.
- B. See Section 09960 – Coating Systems for Water Storage Tanks, for painting and material requirements.

2.2 NON-SHRINK GROUT

- A. Grout for concrete ring wall foundation shall be Sikagrout 212 by Sika Corporation, or approved equal.
- B. The cementitious grout shall be a non-shrink, non-metallic composition containing a blend of selected Portland cements, plasticizing/water-reducing admixtures and shrinkage compensating agents. The shrinkage agents shall compensate for shrinkage in both the plastic and hardened state.

2.3 ELASTOMERIC SEAL

- A. Sealant shall be Sikaflex 1a by Sika Corporation, CIM @ 60 mils, or equal.
- B. Sealant shall be used to seal the tank foundation and all unwelded interior roof seams.

2.4 SEAM AND PIT WELDING

- A. Electrode Type - E70

2.5 PIT FILLER / SURFACER

- B. Pit Filler shall be non-shrinking, trowel-grade epoxy filler Tnemec Series 63-1500 for concrete or steel with bond strength and resistance to abrasion, impact, wet environment, chemicals and corrosive conditions, or equal.
- C. Pit filler and surfacer products shall be ANSI/NSF Standard 61 Certified.

2.6 EXTERIOR LADDER

- A. The new OSHA-complaint aluminum ladder shall extend 24'-0" above the finished grade elevation. The ladder shall have an OSHA-approved fall prevention device consisting of a sliding, locking mechanism and safety belt. Exterior ladder to be equipped with Ladder Gate Climb Preventive Shield. Assembly to be 8 feet long and 0.125" thick aluminum with angled sides. The ladder shall be complete with standoffs every 10' on center. All braces and hardware to be fabricated from galvanized 11-gauge steel. Shield shall be designed to swing open to either side allowing access to the ladder. Assembly to be equipped with a locking device.

- B. The ladder guard shall consist of a lockable, non-climbable aluminum security guard mounted directly over the ladder climbing rungs to prevent vandalism.
- C. The ladder guard shall be no less than 6 feet in height and shall be mounted directly over the ladder rungs. The ladder guard shall have a one-piece piano-type hinge.
- D. The existing coax cables will be moved off the ladder and put in new PVC conduits supported independently to the tank wall.
- E. Post signage reading, “Fall Protection Required,” at the base of the exterior shell access ladder.
- F. Ladder mounting and supports shall be welded to the existing tank. Provide mounting and support details with shop drawing submittal.

2.7 ROOF HANDRAIL

- A. The existing handrail shall be extended on the tank roof to the vent as shown on the Drawings. Handrail shall include an intermediate rail, toeboard, and a safety swing gate at the junction of the access ladder.
- B. All fittings shall be Hollaender speed rail system or equal. Toeboard shall be attached using Hollaender clips or equal.
- C. All posts and rails shall be 6061-T6 Schedule 80 anodized aluminum pipe.
- D. Stainless steel anchors shall be used to connect the handrail system to the tank dome. Welding of base plates to the tank shall be performed by a certified welder. Mounting and tank connection details shall be submitted with handrail shop drawings.

2.8 ROOF SAFETY WALKWAY SYSTEM

- A. Provide non-slip safety walkway on the existing tank roof from the top of ladder to the vent as shown on the Drawings.
- B. The walkway shall be constructed from glass reinforced nylon treads attached to aluminum support beams. Walkway system shall Kee Walk, or equal.
- C. The walkway system shall be OSHA compliant and designed for the existing tank ellipsoid 2:1 sloped roof.
- D. Mounting and tank connection details shall be submitted with walkway system shop drawings. Mounting hardware may be secured to the tank by welding.

2.9 OVERFLOW SCREEN AND CHECK VALVE

- A. The air gap or exit of the overflow at the ground level must be outfitted with a 24 mesh fine screen. The screen shall be retained between one class 150 steel flange on the pipe and a removable flange that secures the screen in place and be removable.
- B. Check valve shall be all rubber and flow operated check type with a flanged end connection. The port area shall contour down to a duckbill, which shall allow passage of flow in one direction while preventing reverse flow. The flange and flexible duckbill sleeve shall be one piece rubber construction fabricated of NSF-61 approved elastomers with nylon reinforcement.
- C. The flange drilling shall conform to ANSI B16.1 Class 125/ANSI B16.5 Class 150 standards. The valve shall be furnished with stainless steel backup rings for installation.
- D. The duckbill check valve shall be installed on the modified 6-inch overflow pipe as shown on the Drawings. The check valve shall be Tideflex Series 35, by Red Valve Company, Inc., or approved equal.

2.10 VALVE VAULT HATCH

- A. The access hatch at the existing valve vault shall be replaced. The Contractor shall field verify existing concrete vault hatch opening dimensions.
- B. The hatch shall be single leaf 30-in x 30-in Type J-AL H20 hatch by Bilco, or equal.
- C. Material: 1/4" (6mm) aluminum cover and extruded aluminum frame.
- D. Cover: Diamond-pattern tread plate reinforced for H-20 wheel loading.
- E. Frame: Extruded aluminum channel frame with bend down anchor tabs around the perimeter. A 1-1/2" drain coupling shall be welded under the frame for a pipe connection to a dry well or disposal system.
- F. Hinges: Heavy forged Type 316 stainless steel hinges with 1/4" (6 mm) type 316 stainless steel hinge pins.
- G. Latch: Type 316 stainless steel slam lock with fixed interior handle and removable exterior turn/lift handle. Latch release is protected by a flush, gasketed, removable screw plug.
- H. Lift Assistance: Compression spring operators enclosed in telescopic tubes. Automatic hold-open arm with release handle automatically locks cover(s) in the open position.
- I. Finish: Mill Finish aluminum with a bituminous coating applied to the exterior of the frame

- J. Hardware: Type 316 stainless steel throughout.
- K. Hatch shall be equipped fall protection and a drainage channel connection to existing valve vault hatch drain piping.

2.11 VALVE VAULT PRESSURE/LEVEL TRANSMITTER

- A. The pressure/level indicating transmitter for the water storage tank vault shall measure feet of water level (ft) in the range of 0 to 100 ft and an operating temperature range of -20 to 185 degrees F. Span limits shall be 10 and 300 psi. Transmitters shall have an accuracy of $\pm 0.25\%$ of calibrated span and $\pm 0.1\%$ repeatability of maximum span. Range is to be fully adjustable using allowable span and range limits. Transmitters shall be 2 wire providing a 4-20 mA DC output signal with non-interacting zero and span adjustments. Supply voltage shall be 24 VDC loop power. Units shall provide local indication of measured water level with on-board configuration pushbuttons and internal lightning arrestors. Electric terminations shall be in a NEMA 4X enclosure provided with a terminal strip. All wetted parts shall be 316 stainless steel. All necessary accessories required for installation and mounting shall be included.
- B. Pressure/level transmitters shall be Foxboro, ABB, Rosemount or equal.
- C. Instrument shall be UL approved, NSF 61 and suitable for operation in the environment of the project. All electronic/digital equipment shall be provided with radio frequency interference protection. All transmitter output signals shall include signal and power source isolation and boosting (as required).
- D. Instrument shall be supplied with suitable mounting hardware. The pressure/level transmitter in the valve vault shall be pipe mounted.

2.12 TANK SAMPLE TAP SYSTEM

- A. Wetted system components shall be lead-free brass or copper sized as shown on the drawings. Corporation stop, valves and appurtenances shall be by Red Head or equal.
- B. Backflow prevention device shall be double check valve style Model 950XL3 by Zurn Wilkins, or approved equal.
- C. Sample tap shall be smooth nosed.
- D. Pressure indicating gage shall be by Ashcroft, Rosemount, or approved equal supplier. Pressure range 0-60 psi, dry filled casing, 4.5 inch dial, 1/4-in NPT connection, mounted on tee and supported as required by manufacturer. NEMA 4X housing.
- E. The enclosure shall be NEMA 4X steel minimum dimensions as shown on Drawings. Single door continuous hinge with 3-point latch and 1/4 turn lever handle, pad lockable. The enclosure shall be insulated with 2-in rigid foam insulating boards. Interior shall be lined with 1/4-in birch plywood.

- F. Enclosure shall be provided with duplex 120VAC receptable mounted on the interior plywood side wall.

PART 3 - EXECUTION

3.1 RELOCATION OF ANTENNAS

- A. During proposed work, 911 and meter read antennas must be temporarily relocated and remain functional for the duration of the project. Contractor shall permanently relocate the antennas on the rehabilitated water storage tank at the end of the project. Mount antennas from roof handrail post or other location approved by Engineer and in compliance with OSHA regulations so as not to impede safe access to the tank.

3.2 SURFACE PREPARATION OF NEW TANK COMPONENTS

- A. See Section 09960 – Coating Systems for Water Storage Tanks for surface requirements.
- B. Surface preparation for welding of new tank accessories shall be in accordance with welding specifications and codes.
- C. Field Cleaning: After completion of tank structural appurtenances, remove burrs, dirt, and construction debris and repair damaged finishes. Remove weld splatter, sharp edges on weld seams, and scabs and slivers by grinding. Remove weld flux, slag, fins, and laminations.
- D. Field Surface Preparation: After field cleaning, prepare steel surfaces where shop prime coat has been damaged according to the Specifications listed above for shop cleaning, and remove dust or residue from cleaned surfaces.
- E. If surface develops rust before prime coat is applied, repeat field surface preparation.

3.3 GROUT REMOVAL AND REPLACEMENT

- A. The Contractor shall remove and chisel all existing mastic and loose grout at the base of the tank, as directed by the Engineer, and replace with non-shrink grout. Remove existing grout to a depth of at least 3 inches beyond the outside face of the bottom plate.
- B. Areas to be repaired must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare concrete substrate to obtain a surface profile of CSP 4 or greater (as per ICRI Guidelines) with a new exposed aggregate surface.
- C. Remove all rust and scale from concrete and steel bottom plate prior to placement of new grout.

- D. Clean substrates of loose aggregate, dust, laitance, dirt, oil, grease by bush-hammering, clipping or brushing. Enclose the area or make other necessary preparations.
- E. Apply bonding agent as recommended by grout manufacturer.
- F. Product mixing, application and curing shall be in accordance with manufacturer's recommendations.

3.4 PLACING ELASTOMERIC SEALANT

- A. Place only after the non-shrink grout is thoroughly dried per the grout manufacturer's curing recommendations.
- B. Clean surface of non-shrink grout to remove all curing compound residue.
- C. Place elastomeric sealant quickly and continuously.
- D. Place elastomeric sealant such that it covers and seals the exposed face of the non-shrink grout and is sloped away from the tank. The edge of the face of the elastomeric sealant shall meet the bottom tank plate at the outside edge of the bottom plate. Place so as to avoid entrapping air.
- E. Smooth before set with wetted tool and trim elastomeric sealant shoulders.

3.5 PIT FILLING, PIT WELDING AND PLATE WELDING REPAIR

- A. **PIT FILLING** - Contractor shall evaluate and inspect tank to determine repair requirements and report to Engineer. All areas have metal loss or damage less than 35 % shall receive Tnemac 66-1500 100% solids filler (or equal) to bring these surfaces level with the steel surface.
- B. **PIT WELDING** - Prior to the application of any coating all areas of metal loss representing a 35 % or more reduction in corresponding plate thickness should then be spot welded sufficiently to bring the pit flush with the original plate surfaces.
- C. **PLATE WELDING REPAIR** - Areas that develop holes either during abrasive cleaning and/or welding or represent concentrated metal loss should have new steel plate welded into place. The steel plate should be sufficient so as to tie into sound metal and have at least a ¼ inch continuous fillet weld around the patch.
 - 1. A "Plate" is defined as a section of flat steel that is 12" x 12" or smaller. Sections larger will be identified as a roof plate replacement. Repair plates shall be seam welded in place as directed by the inspector and engineer.

2. Plate Replacement is referred to as a roof plate section or roof plate larger than 12"x12". Entire roof plates may be replaced if in the determination of the engineer and inspector the cost to the Owner is less than cutting out a large portion and welding the replacement portion. All plates shall be seam welded in place when used.
- D. Welded or filled areas will be reblasted prior to application of the primer.

3.6 WELDING

- A. The Contractor shall comply with with AWS D1.1 and AWS C5.4 for procedures and quality of welds and for methods used to correct failed welds. All welder and welding processes shall be qualified in accordance with AWS "Standard Qualification Procedures". The Contractor shall adhere to AWS recommended "Safe Practices for Welding".
- B. All welding shall be done using E70XX electrodes and welding shall conform to AISC and DI.1 where fillet weld sizes are not shown provide the minimum size per Table J2.4 in the AISC "Manual of Steel Construction", 9th Edition.
- C. Surface preparation prior to welding shall meet minimum requirements of AWS guidelines. Prepare the surface by spot removing paint to the bare metal using power brushing in accordance with SSPC-SP11, using 3M Strip-n-Clean flexible wheel or approved equal. Follow power brush cleaning with a non-flammable solvent cleaner to remove any oils, contaminants, rust or dirt prior to welding.

3.7 LADDER, RAILINGS, WALKWAY

- A. Install new safety ladder system, handrails and walkway system in accordance with the manufacturer's instructions and approved shop drawing mounting details.
- B. Welding if required for mounting of ladder system, handrail, walkway system of other components shall be performed prior to final exterior tank coating.
- C. Installation of non-welding components shall be performed after exterior painting is complete.

3.8 TANK SAMPLE TAP SYSTEM

- A. The steel tank shall be tapped using approved tapping equipment and methods.
- B. The enclosure housing the tapping system shall be mounted to the tank using approved methods. Supports shall be installed per the approved shop drawings design and installation direction.

C. All gaps between the enclosure and the tank, or through conduit or piping penetrations shall be sealed with approved product to protect the wetted sample taps components from freezing.

D. Sample tank piping and wetted components shall be disinfected by approved methods.

3.9 FIELD PAINTING

A. See Section 09960 – Coating Systems for Water Storage Tanks of these Contract Specifications.

3.10 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified testing agency to perform the following field quality control testing:

1. Weld Testing: As required in AWS “Standard Qualification Procedures” at intervals and in locations approved by Engineer.
2. Leakage Test: See Specification Section 09960 – Coating Systems for Water Storage Tanks for leakage and other final testing associated with completed tank restoration.

B. Remove and replace malfunctioning units and retest as specified above.

3.11 CLEANING AND DISINFECTION

A. See Section 09960 – Coating Systems for Water Storage Tanks of these Contract Specifications for final cleaning and disinfection requirements of the elevated storage tank upon completion of restoration and painting work.

END OF SECTION 13210

DIVISION 16 - ELECTRICAL

<u>Section</u>	<u>Title</u>
16060	Grounding and Bonding
16070	Electrical Hanger and Supports
16075	Electrical Identification
16123	Wire and Cable
16130	Raceway and Boxes
16140	Wiring Devices
16410	Enclosed Switches and Circuit Breakers

SECTION 16060

GROUNDING AND BONDING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rod electrodes.
 - 2. Wire.
 - 3. Mechanical connectors.
 - 4. Exothermic connections.

1.2 REFERENCES

- A. Institute of Electrical and Electronics Engineers:
 - 1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
- D. Code of Massachusetts Regulations:
 - 1. 527 CMR 12.00 - Massachusetts Electrical Code.

1.3 SYSTEM DESCRIPTION

- A. Grounding systems use the following elements as grounding electrodes:
 - 1. Rod electrode.

1.4 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms maximum.

1.5 SUBMITTALS

- A. Test Reports: Indicate overall resistance to ground.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of components and grounding electrodes.

1.7 QUALITY ASSURANCE

- A. Products and Installation: NFPA 70.
- B. Products and Installation: 527 CMR 12.00.
- C. Products: UL labeled for products in category for which UL labeling is available.
- D. Products: New and unused.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.
- B. Installer: Company specializing in performing work of this section with minimum three years experience.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

PART 2 PRODUCTS

2.1 ROD ELECTRODES

- A. Product Description:
 - 1. Material: Copper-clad steel.
 - 2. Diameter: 3/4 inch.
 - 3. Length: 10 feet.
- B. Connector: Connector for exothermic welded connection.

2.2 WIRE

- A. Material: Stranded copper.
- B. Grounding Electrode Conductor: Copper conductor insulated.
- C. Bonding Conductor: Copper conductor insulated.

2.3 MECHANICAL CONNECTORS

- A. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.4 EXOTHERMIC CONNECTIONS

- A. Manufacturers:
 1. Apache Grounding/Erico Inc.
 2. Cadweld, Erico, Inc.
 3. Copperweld, Inc.
 4. Thomas & Betts, Electrical.
 5. Substitutions: Equal product.
- B. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 PREPARATION

- A. Remove surface contaminants at connection points.

3.3 INSTALLATION

- A. Install in accordance with IEEE 142.
- B. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground.
- C. Install rod electrodes plumb with top 12 inches below grade.
- D. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway and cable. Terminate each end on suitable lug, bus, or bushing.
- E. Permanently ground entire light and power system including service equipment, distribution panels, lighting panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.
- F. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.4 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.
- C. Perform ground resistance testing in accordance with IEEE 142.
- D. Perform continuity testing in accordance with IEEE 142.
- E. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION

SECTION 16070

ELECTRICAL HANGERS AND SUPPORTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Conduit supports.
 - 2. Formed steel channel.
 - 3. Spring steel clips.
 - 4. Sleeves.
 - 5. Equipment supports.

1.2 REFERENCES

- A. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
- B. Code of Massachusetts Regulations:
 - 1. 527 CMR 12.00 - Massachusetts Electrical Code.

1.3 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.
- B. Installer: Company specializing in performing work of this section with minimum three years experience.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Provide ventilation in areas to receive solvent cured materials.

PART 2 PRODUCTS

2.1 CONDUIT SUPPORTS

- A. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.
- B. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.
- C. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- D. Conduit clamps - general purpose: One hole malleable iron or plastic clip for surface mounted conduits.
- E. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self locking.

2.2 FORMED STEEL CHANNEL

- A. Manufacturers:
 - 1. B-Line Systems.
 - 2. Midland Ross Corporation, Electrical Products Division.
 - 3. Unistrut Corp.
 - 4. Substitutions: Equal producer.
- B. Product Description: Galvanized 12 gage thick steel. with holes 1-1/2 inches on center.

2.3 SPRING STEEL CLIPS

- A. Product Description: Mounting hole and screw closure.

2.4 SLEEVES

- A. Sleeves for Through Non-fire Rated Floors: 18 gage thick galvanized steel.
- B. Sleeves for Through Non-fire Rated Walls: Steel pipe or 18 gage thick galvanized steel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify openings are ready to receive sleeves.

3.2 INSTALLATION - HANGERS AND SUPPORTS

- A. Anchors and Fasteners:

1. Concrete Structural Elements: Provide precast inserts, expansion anchors and powder actuated anchors.
 2. Steel Structural Elements: Provide beam clamps, spring steel clips and steel ramset fasteners.
 3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors.
 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.
 5. Solid Masonry Walls: Provide expansion anchors and preset inserts.
 6. Sheet Metal: Provide sheet metal screws.
 7. Wood Elements: Provide wood screws.
- B. Install conduit and raceway support and spacing in accordance with NFPA 70.
- C. Install conduit and raceway support and spacing in accordance with 527 CMR 12.00.
- D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- E. Install multiple conduit runs on common hangers.
- F. Supports:
1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
 2. Install surface mounted cabinets and panelboards with minimum of four anchors.
 3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.

3.3 INSTALLATION - EQUIPMENT SUPPORTS

- A. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.
- B. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.

3.4 INSTALLATION - SLEEVES

- A. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- C. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.
- D. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with stuffing insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

3.5 PROTECTION OF FINISHED WORK

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 16075

ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Nameplates.
 - 2. Labels.
 - 3. Wire markers.
 - 4. Underground Warning Tape.

1.2 DELIVERY, STORAGE, AND HANDLING

- A. Accept identification products on site in original containers. Inspect for damage.
- B. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- C. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.3 ENVIRONMENTAL REQUIREMENTS

- A. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 PRODUCTS

2.1 IDENTIFICATION NAMEPLATES

- A. Product Description: Laminated plastic with engraved white letters on black background color.
- B. Letter Size:
 - 1. 1/8 inch high letters for identifying individual equipment and loads.
 - 2. 1/4 inch high letters for identifying grouped equipment and loads.
- C. Minimum nameplate thickness: 1/8 inch.

2.2 WARNING NAMEPLATES

- A. Product Description: Laminated plastic with engraved black letters on yellow background color.

- B. Letter Size: 3/8 inch.
- C. Minimum nameplate thickness: 1/8 inch.

2.3 LABELS

- A. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

2.4 WIRE MARKERS

- A. Description: Cloth tape, split sleeve, or tubing type wire markers.
- B. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number.
 - 2. Control Circuits: Control wire number as indicated on shop drawings.

2.5 UNDERGROUND WARNING TAPE

- A. Description: 6 inch wide plastic tape, colored red with suitable warning legend describing buried electrical lines.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- A. Install identifying devices after completion of painting.
- B. Nameplate Installation:
 - 1. Install nameplate parallel to equipment lines.
 - 2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.
 - 3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.
 - 4. Secure nameplate to equipment front using screws or adhesive.
 - 5. Secure nameplate to inside surface of door on recessed panelboard in finished locations.
 - 6. Install nameplates for the following:
 - a. Panelboards.
 - b. Service Disconnects.
 - c. Transfer Switches.
 - d. Control Panels.
- C. Label Installation:
 - 1. Install label parallel to equipment lines.

2. Install label for identification of individual control device stations, and wall switches where their purpose is not readily obvious.
 3. Install labels for permanent adhesion and seal with clear lacquer.
- D. Wire Marker Installation:
1. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
 2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.
- E. Underground Warning Tape Installation:
1. Install underground warning tape along length of each underground conduit, raceway, or cable 12 inches below finished grade, directly above buried conduit, raceway, or cable.

END OF SECTION

SECTION 16123

WIRE AND CABLE

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Building wire and cable.
 - 2. Signal cable.
 - 3. Antenna cable.
 - 4. Wiring connections.

1.2 REFERENCES

- A. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- B. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
- C. Code of Massachusetts Regulations:
 - 1. 527 CMR 12.00 - Massachusetts Electrical Code.

1.3 SYSTEM DESCRIPTION

- A. Product Requirements: Provide products as follows:
 - 1. Solid conductor for feeders and branch circuits 10 AWG and smaller.
 - 2. Stranded conductors for control circuits.
 - 3. Conductor not smaller than 12 AWG for power and lighting circuits.
 - 4. 14 AWG, 19 strand conductor for control circuits.
- B. Wiring Methods: Provide only the following wiring methods:
 - 1. Unfinished Interior Locations: Use building wire and signal cable in raceway.
 - 2. Exterior Locations: Use building wire and signal cable in raceway.
 - 3. Underground Locations: Use building wire and signal in raceway.

1.4 DESIGN REQUIREMENTS

- A. Conductor sizes are based on copper.

1.5 SUBMITTALS

- A. Product Data: Submit for building wire and each cable type.
- B. Test Reports: Indicate procedures and values obtained.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of components and circuits.

1.7 QUALITY ASSURANCE

- A. Products and Installation: NFPA 70.
- B. Products and Installation: 527 CMR 12.00.
- C. Products: UL labeled for products in category for which UL labeling is available.
- D. Products: New and unused.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on Drawings.

1.10 COORDINATION

- A. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.
- B. Wire and cable routing indicated is approximate unless dimensioned.

PART 2 PRODUCTS

2.1 BUILDING WIRE

- A. Product Description: Single conductor insulated wire.
- B. Conductor: Copper.
- C. Insulation: NFPA 70; Type XHHW for power and lighting circuits; Type THWN for control circuits.

2.2 SIGNAL CABLE

- A. Manufacturers:
 - 1. Belden Corp. 8719 for use in raceway.
 - 2. Substitutions: Section 01300 – Equal product.
- B. Product Description: Twisted pair shielded 16 AWG stranded copper conductors.

- C. Insulation Material: Polyethylene.
- D. Insulation Rating: 600 volts.
- E. Shield: Aluminum tape 100 percent overall.
- F. Drain Wire: stranded copper 18 AWG.
- G. Jacket: PVC.

2.3 ANTENNA CABLE

- A. Manufacturers:
 - 1. Times Microwave Systems LMR-400.
 - 2. Substitutions: Section 01300 – Equal product.
- B. Product Description: Coaxial.
- C. Conductors: Aluminum and aluminum tape.
- D. Insulation: Polyethylene foam.
- E. Jacket: Polyethylene.
- F. Braid: Tinned copper.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify interior of building has been protected from weather.
- B. Verify mechanical work likely to damage wire and cable has been completed.
- C. Verify raceway installation is complete and supported.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

- A. Provide all wire and cable connections.
- B. Install an individual neutral conductor with all circuits requiring a neutral connection. Common neutrals not permitted.
- C. Route wire and cable to meet Project conditions.

- D. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- E. Identify wire and cable under provisions of Section 16075. Identify each conductor with its circuit number or other designation indicated.
- F. Special Techniques--Building Wire in Raceway:
 - 1. Pull conductors into raceway at same time.
 - 2. Install building wire 4 AWG and larger with pulling equipment.
- G. Special Techniques - Wiring Connections:
 - 1. Clean conductor surfaces before installing lugs and connectors.
 - 2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
 - 3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.
 - 4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.
 - 5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
 - 6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

3.4 WIRE COLOR

- A. General
 - 1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
 - 2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:
 - a. Black and red for single phase circuits at 120/240 volts.
 - b. Black, red, and blue for circuits at 120/208 volts single or three phase.
 - c. Orange, brown, and yellow for circuits at 277/480 volts single or three phase.
- B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.
- C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.
- D. Feeder Circuit Conductors: Uniquely color code each phase.
- E. Ground Conductors:
 - 1. For 6 AWG and smaller: Green.

2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.5 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION

SECTION 16130
RACEWAY AND BOXES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Conduit.
 - 2. Outlet boxes.
 - 3. Pull boxes.
 - 4. Junction boxes.

- B. Related Sections:
 - 1. Section 02200 - Earthwork.

1.2 REFERENCES

- A. American National Standards Institute:
 - 1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

- B. National Electrical Manufacturers Association:
 - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
 - 2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
 - 3. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit.
 - 4. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

- C. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.

- D. Code of Massachusetts Regulations:
 - 1. 527 CMR 12.00 - Massachusetts Electrical Code.

1.3 SYSTEM DESCRIPTION

- A. Raceway and boxes located as shown on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

- B. Underground: Provide thickwall nonmetallic conduit.

- C. Interior Locations: Provide exposed rigid steel conduit and surface mounting cast-metal boxes.

- D. At Motors and Equipment Subject to Vibration: Provide liquidtight flexible metal conduit.

1.4 DESIGN REQUIREMENTS

- A. Minimum Raceway Size: 1/2 inch conduit for control circuits, 3/4 inch conduit for power and lighting circuits.

1.5 SUBMITTALS

- A. Product Data: Submit for the following:
 - 1. Conduit.

1.6 CLOSEOUT SUBMITTALS

- A. Project Record Documents:
 - 1. Record actual routing of conduits larger than 2 inch trade size.

1.7 QUALITY ASSURANCE

- A. Products and Installation: NFPA 70..
- B. Products and Installation: 527 CMR 12.00.
- C. Products: UL labeled for products in category for which UL labeling is available.
- D. Products: New and unused.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- B. Protect PVC conduit from sunlight.

1.9 COORDINATION

- A. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 PRODUCTS

2.1 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1; hot dipped galvanized with additional sealing finish inside and outside.
- B. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.2 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Non-Hazardous Locations:
 - 1. Product Description: Interlocked steel construction with PVC jacket.
 - 2. Fittings and Conduit Bodies: NEMA FB 1.

2.3 NONMETALLIC CONDUIT

- A. Product Description: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

2.4 OUTLET BOXES

- A. Cast Boxes: NEMA FB 1, Type FD, aluminum or cast ferrous alloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.

2.5 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
 - 1. Material: Galvanized cast iron or cast aluminum.
 - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify outlet locations and routing and termination locations of raceway prior to installation.

3.2 INSTALLATION

- A. Trenching and backfill for underground conduit by Sections 02320 and 02324.
- B. Ground and bond raceway and boxes in accordance with Section 16060.
- C. Fasten raceway and box supports to structure and finishes in accordance with Section 16070.
- D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.3 INSTALLATION - RACEWAY

- A. Make all raceway connections to equipment and devices.

- B. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.
- C. Arrange raceway supports to prevent misalignment during wiring installation.
- D. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- E. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 16070.
- F. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports
- G. Do not attach raceway to ceiling support wires or other piping systems.
- H. Maintain clearance between raceway and piping for maintenance purposes.
- I. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.
- J. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- K. Bring conduit to shoulder of fittings; fasten securely.
- L. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.
- M. Install conduit hubs to fasten conduit to surface mounting sheet metal boxes.
- N. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2 inch size.
- O. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.
- P. Install fittings to accommodate expansion and deflection where raceway crosses seismic, control and expansion joints.
- Q. Install suitable pull string or cord in each empty raceway except sleeves and nipples.
- R. Install suitable caps to protect installed conduit against entrance of dirt and moisture.
- S. Install underground conduit 36 inch minimum below finished grade or surface. Set conduits on 3 inch sand bed with 3 inch sand cover. Space power conduits not less than 12 inches from telephone and signal conduits.

T. Install warning tape in accordance with Section 16075.

3.4 INSTALLATION - BOXES

- A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings.
- B. Adjust box location up to 10 feet prior to installation to accommodate intended purpose.
- C. Orient boxes to accommodate wiring devices oriented as specified in Section 16140.
- D. Support boxes independently of conduit.
- E. Install gang box where more than one device is mounted together. Do not use sectional box.

3.5 INTERFACE WITH OTHER PRODUCTS

- A. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.
- B. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.6 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 16140
WIRING DEVICES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wall switches.
 - 2. Receptacles.
 - 3. Device plates.

- B. Related Sections:
 - 1. Section 16130 - Raceway and Boxes: Outlet boxes for wiring devices.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA WD 1 - General Requirements for Wiring Devices.
 - 2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

- B. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.

- C. Code of Massachusetts Regulations:
 - 1. 527 CMR 12.00 - Massachusetts Electrical Code.

1.3 QUALITY ASSURANCE

- A. Products and Installation: NFPA 70 and 527 CMR 12.00.

- B. Products: UL labeled for products in category for which UL labeling is available.

- C. Products: New and unused.

1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 PRODUCTS

2.1 WALL SWITCHES

- A. Product Description: NEMA WD 1, Heavy-Duty, Industrial Specification Grade, AC only general-use snap switch.

B. Body and Handle: Brown plastic with toggle handle.

C. Ratings:

1. Voltage: 120-277 volts, AC.
2. Current: 20 amperes.

2.2 GENERAL USE RECEPTACLES

A. Product Description: NEMA WD 1, Heavy-Duty, Industrial Specification Grade, general use receptacle.

B. Device Body: Brown plastic.

C. Configuration: NEMA WD 6.

D. Convenience Receptacle: Type 5-20.

E. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

2.3 DEVICE PLATES

A. Cover Plate: Gasketed weatherproof cast metal plate with hinged, gasketed device cover for receptacles and lever operator for wall switches.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify outlet boxes are installed at proper height.

B. Verify wall openings are neatly cut and completely covered by wall plates.

C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Clean debris from outlet boxes.

3.3 INSTALLATION

A. Surface mount devices.

B. Provide decorative cover plates for interior flush mounting devices.

C. Provide weatherproof cover plates for surface mounting devices in non-hazardous locations.

- D. Install devices plumb and level.
- E. Install switches with OFF position down.
- F. Install receptacles with grounding pole on top.
- G. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.

3.4 INTERFACE WITH OTHER PRODUCTS

- A. Install wall switch 48 inches above finished floor.
- B. Install convenience receptacle 24 inches above finished floor.

3.5 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.

3.6 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.7 CLEANING

- A. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 16410

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes;
 - 1. Molded case circuit breakers.

1.2 REFERENCES

- A. National Electrical Manufacturers Association:
 - 1. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
 - 2. NEMA AB 1 - Molded Case Circuit Breakers and Molded Case Switches.
- B. International Electrical Testing Association:
 - 1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
- C. National Fire Protection Association:
 - 1. NFPA 70 - National Electrical Code.
- D. Code of Massachusetts Regulations:
 - 1. 527 CMR 12.00 - Massachusetts Electrical Code.

1.3 SUBMITTALS

- A. Product Data: Submit catalog sheets showing ratings, trip units, time current curves, dimensions and enclosure details.

1.4 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of enclosed switches and circuit breakers and ratings of installed fuses.

1.5 QUALITY ASSURANCE

- A. Products and Installation: NFPA 70 and 527 CMR 12.00.
- B. Products: UL labeled for products in category for which UL labeling is available.
- C. Products: New and unused.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 PRODUCTS

2.1 MOLDED CASE CIRCUIT BREAKER

- A. Product Description: Enclosed, molded-case, thermal-magnetic circuit breaker conforming to NEMA AB 1, suitable for use as service entrance equipment where so applied.
- B. Enclosure: NEMA AB 1, Type 12. Provide handle padlocking provisions.
- C. Service Entrance: Breakers identified for use as service equipment are to be labeled for this application. Furnish solid neutral assembly and equipment ground bar.

2.2 SURGE PROTECTION DEVICES

- A. Surge protection equipment shall consist of a 3 phase surge capacitor and a 3 phase lightning arrester. The lightning arrester shall be General Electric Co., Model No. 9L15, or equal. The surge capacitor shall be General Electric Co. Model No. 9L18, or equal

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install enclosed switches and circuit breakers plumb. Provide supports in accordance with Section 16070.
- B. Height: 5 feet to operating handle.
- C. Install engraved plastic nameplates in accordance with Section 16075.
- D. Hub-mount surge protection devices on main disconnect enclosure.

3.2 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. For circuit breakers, perform inspections and tests listed in NETA ATS, Section 7.6.1.1.

3.3 ADJUSTING

- A. Adjust trip settings to coordinate circuit breakers with other overcurrent protective devices in circuit.

- B. Adjust trip settings of circuit breakers to provide adequate protection from overcurrent and fault currents.

END OF SECTION

APPENDIX A

Tank Inspection Reports dated March 28, 2019



**City of Waltham
169 Lexington Street
Waltham, MA 02452
RE: Waltham, MA
2,000,000 Gallon STP
March 28, 2019
Mr. Ian McKenzie
Assistant City Engineer
(781) 314-3852
Job No. 319006-A**

If you would like to speak with Patrick Heltsley concerning this report, call (270) 826-9000, Ext. 4601

For additional copies of this report call (270) 826-9000, Ext. 4601

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Photo shows the tank is secured with fencing. There is no signage on the fence. We recommend posting a **Warning, Tampering With This Facility is a Federal Offense (US code title 42, section 300i-1)** sign and a **No Trespassing** sign.



Photo shows the area around the tank foundation is properly graded and in compliance with [AWWA D100-11; 12.7.1 Height aboveground.](#)



Photo shows the condition of the foundation. We recommend sealing the foundation with a sealant.



Photo shows the tank is electrically grounded for lightning protection as required by **OSH Act of 1970 Section 5** and appears to be in good condition.



Photo shows the condition of one (1) of the twelve (12) anchor bolts. **AWWA D100-11; 3.8.1.1 Required anchorage** states, "For ground-supported flat-bottom reservoirs and standpipes, mechanical anchorage shall be provided when the wind or seismic loads exceed the limits for self-anchored tanks." We recommend cleaning the area around the anchor bolts then tightening the jam nuts to specifications.



Photo shows the condition of the shell. Currently there is no drain valve. We recommend installing a frost proof drain valve near the shell-to-floor connection, complete with a locking device to prevent unauthorized draining of the tank and a splash pad to direct water away from the foundation.

**Splash pad to be installed by owner.*



Photo shows the condition of the primary elliptical shell manway. The following is required for the tank to be in compliance with **AWWA D100-11; 7.4.4 Shell manholes**, and **OSHA 1910.146(c)(2) Confined spaces**.

We recommend:

Post **Confined Space Entry** sign



Photo shows the condition of the secondary shell manway. The following is required for the tank to be in compliance with [AWWA D100-11; 7.4.4 Shell manholes](#), and [OSHA 1910.146\(c\)\(2\) Confined spaces](#).

We recommend:

Post **Confined Space Entry** sign



Photos show the 6" overflow pipe system, which is not equipped with a flapper valve as required by **AWWA D100-11; 7.3 Overflow**. We recommend installing a flapper valve and new screen on the existing overflow pipe.



Shell access ladder in above photos is not equipped with anti-skid rungs, and is only 15" wide. **OSHA 1910.23(b)(4)** states, "Ladder rungs, steps, and cleats have a minimum clear width of... 16 inches (41 cm) (measured before installation of ladder safety systems) for fixed ladders,..." We recommend installing an **OSHA** compliant shell access ladder complete with standoffs every 10' on center, a cable type ladder safety device, a lockable ladder guard to prevent unauthorized access and posting a **Fall Protection Required** sign at the base of the ladder.

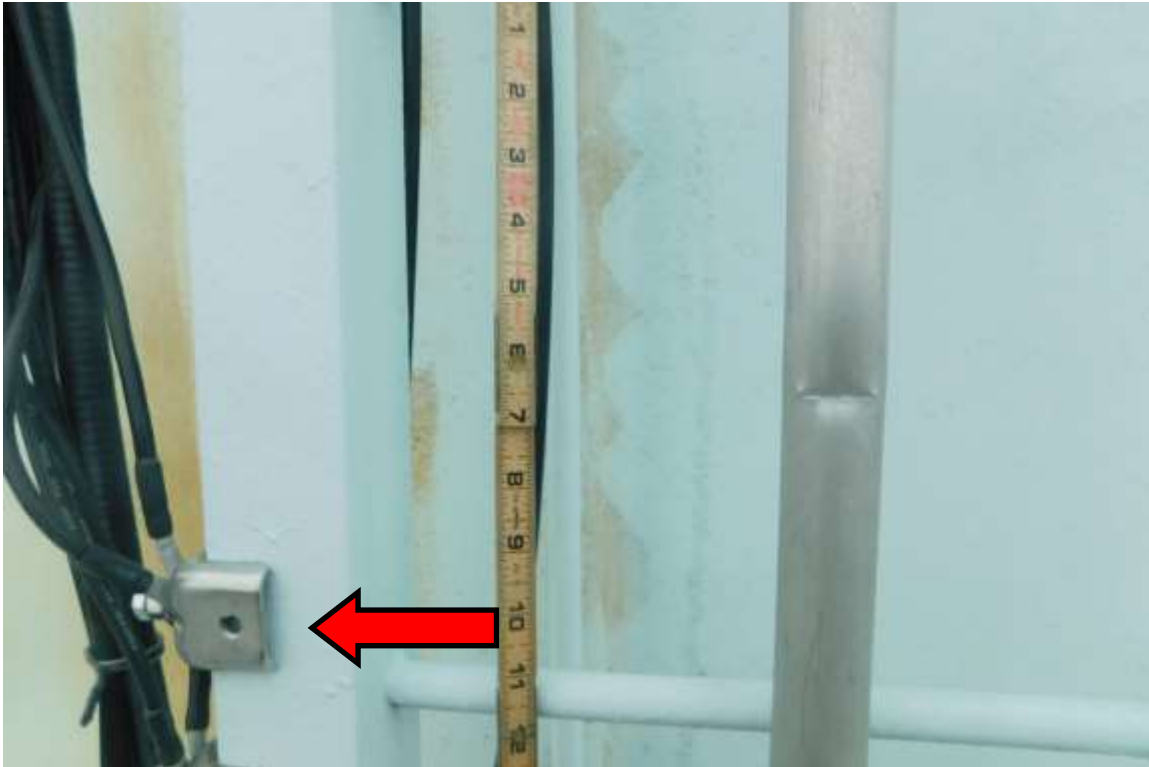
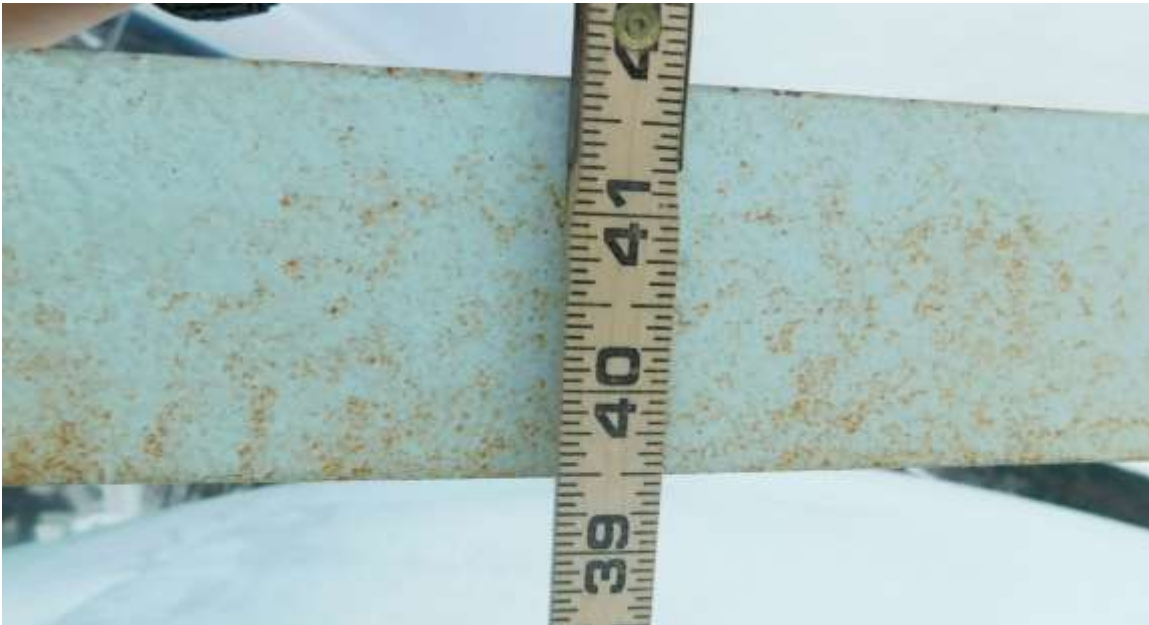


Photo shows more of the condition of the existing shell access ladder. Safe climbing procedure requires a person to climb a ladder with their hands on the side rails of the ladder and not the ladder rungs. **Notice a co/ax is mounted on the ladder side rail, creating a climbing safety hazard.** We recommend removing the co/ax from the ladder, and securing it with standoffs to the tank shell to eliminate this climbing safety hazard.



Photo shows the tank is not equipped with a liquid level indicator. We recommend installing a float-type liquid level indicator.



Photos show the tank roof edge is not equipped with a required handrail system for fall protection. **OSHA 1910.28(b)(1)(i)** states, "...the employer must ensure that each employee on a walking-working surface with an unprotected side or edge that is 4 feet (1.2 m) or more above a lower level is protected from falling by one or more of the following: **1910.28(b)(1)(i)(A) Guardrail systems.**" The tank is equipped with 42" high handrails to the left of the access ladder. We recommend extending the handrails around the circumference of the tank roof, complete with an intermediate rail, a toeboard, and a swing gate at the junction of the shell-to-roof access ladder and tank roof.



Photo shows the condition of the primary roof hatch. Roof openings on this tank require the following to be in compliance with **AWWA D100-11; 7.4.3 Roof openings** and **OSHA 1910.146(c)(2) Confined spaces**.

We recommend:

Install 30" secondary hatch 180° from primary roof hatch
Post **Confined Space Entry** sign

We further recommend installing **OSHA** compliant interior access ladders complete with standoffs every 10' on center, and cable type ladder safety devices at the primary and suggested secondary roof hatches.

**In cold climates it's up to the owner's discretion on placement of internal ladders.*



Photos show the existing roof vent, which appears to be in good condition



Photos show the tank exterior coating system. We recommend pressure washing the tank exterior with biodegradable detergent injection (minimum 3,500 psi at 3.0 gpm) then removing all loose rust and scale with wire brushes and hand scrapers in accordance with SSPC#2 (hand tool cleaning), spot priming and applying one (1) finish coat of acrylic paint.



Photo shows the condition of the interior roof. Notice the rust forming at the roof seams. We recommend seam sealing using Sikaflex® 1a on all un-welded interior roof seams to prevent failure of a new interior liner. This work is to be performed in conjunction with application of new interior liner.



Photo shows a fill pipe on the tank interior. A temperature difference between the water in the top and bottom of a tank, even as little as 1-2 degrees Fahrenheit, is an indication of thermal stratification and the tank water not being completely mixed. Incomplete mixing would result in short-circuiting, and localized increase in water age would develop inside the tank. This typically leads to water quality problems, such as loss of residual, DBP spikes, HPC spikes, bacteria regrowth, formation of bio-film, changes in pH and dissolved oxygen. We recommend installing a mixing system. Electrical work to be done by others if required.

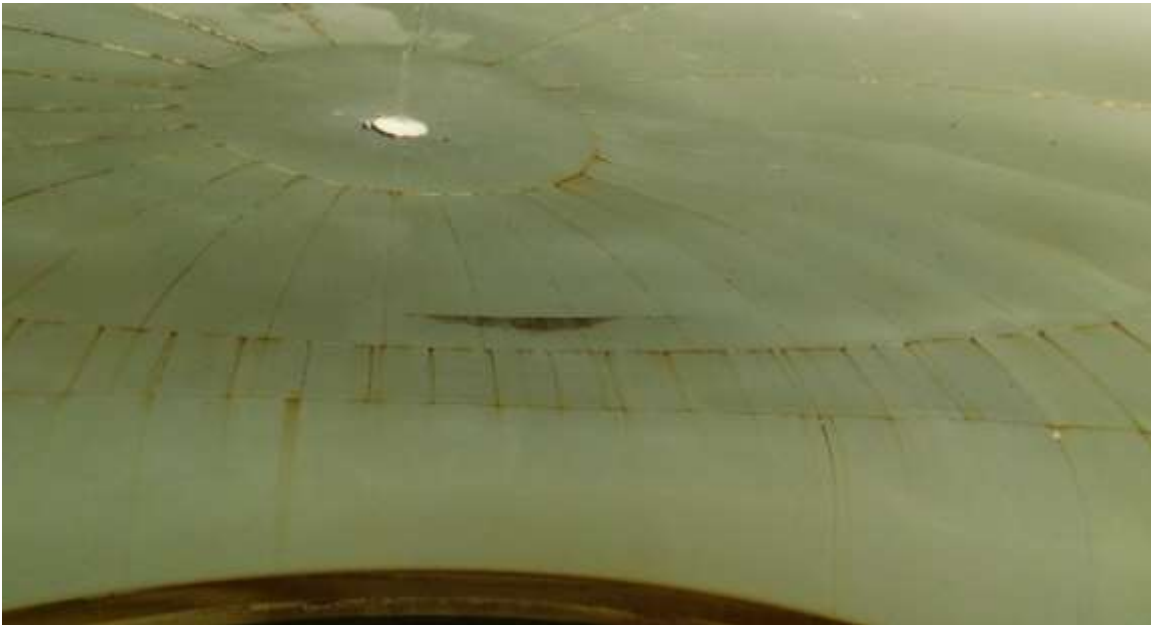


Photos show sediment in the tank. We recommend performing a robotic in-service interior cleanout in order to prevent contamination issues associated with excessive sediment buildup.

This work should be performed on an emergency basis.

**Please note price for interior cleanout is based on removing 1" – 3" of sediment. Any additional accumulation discovered will be removed in the amount of \$300 per hour. In the event the tank has to be drained, tank will need to be drained by the owner, prior to our arrival.*

We further recommend installing a passive cathodic protection system.



Photos show the condition of the interior coating system. We recommend sandblasting all rusted and abraded interior areas to SSPC-SP10 (near white), and brush blasting all remaining interior areas to SSPC-SP7; then applying one (1) spot coat of epoxy primer to all areas sandblasted to #10, stripe coating all weld seams, and applying epoxy to the entire tank, to achieve 8 to 10 mils of total dry film thickness. Total mil thickness will include a combination of the existing and new coating.



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Henderson, KY 42419
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STANDPIPE INSPECTION REPORT

JOB NO: 319006-A INSPECTOR: Brian Alsup (LS)
TANK OWNER: City of Waltham
OWNER'S REPRESENTATIVE: Mr. Ian McKenzie
TITLE: Assistant City Engineer
MAILING ADDRESS: 169 Lexington Street Waltham, MA 02452
PHYSICAL ADDRESS: 169 Lexington Street Waltham, MA 02452
E-MAIL: IMcKenzie@city.waltham.ma.us
CITY, STATE: Waltham, MA ZIP: 02452 COUNTY: Middlesex County
TELEPHONE: (781) 314-3852 FAX: Not Provided
LOCATION OF TANK: Loop Rd Waltham, MA 02452

**City of Waltham
169 Lexington Street
Waltham, MA 02452
March 28, 2019
Mr. Ian McKenzie
Assistant City Engineer
(781) 314-3852**

ORIGINAL CONTRACT NO: Not Provided YEAR BUILT: Not Provided
ORIGINAL MANUFACTURER: Not Provided CAPACITY: 2,000,000 Gallon
DATE OF LAST INSPECTION: Not Provided TYPE: Potable
DIAMETER: 65'-0" HEIGHT: 84'-4"
OVERFLOW: 6" INLET: 6"
TYPE CONSTRUCTION: WELDED: X RIVETED: BOLTED:
ACCOUNT EXECUTIVE: Nick Nation

Mil Thickness Testing								
Shell 10	16.0	14.8						
Shell 9	12.4	14.8						
Shell 8	10.2	12.1						
Shell 7	11.9	7.1						
Shell 6	8.8	9.5						
Shell 5	10.4	8.4						
Shell 4	11.8	12.9						
Shell 1	8.5	7.0	6.9	7.4	8.5	6.6	7.1	7.6
	11.0	8.2	7.3	8.5	7.9			

Ultrasonic Thickness Testing								
Shell 10	0.239	0.250						
Shell 9	0.254	0.255						
Shell 8	0.275	0.268						
Shell 7	0.345	0.347						
Shell 6	0.403	0.408						
Shell 5	0.498	0.493						
Shell 4	0.487	0.486						
Shell 1	0.647	0.656	0.662	0.656	0.658	0.651	0.649	0.659
	0.654	0.644	0.651	0.660	0.655			

Page #	Work Proposed	Critical Deficiency	NON-Critical Deficiency	OSHA	Structural	Preventive Maintenance
2	Post a Warning, Tampering With This Facility is a Federal Offense (US code title 42, section 300i-1) sign.		X			
	Post a No Trespassing sign.		X			
4	Seal the foundation with a sealant.					X
6	Clean the area around the anchor bolts, then tighten the jam nuts to specifications.					X
7	Install a frost proof drain valve near the shell-to-floor connection, complete with a locking device and a splash pad. <i>Splash pad to be installed by owner.</i>		X			
8	Post Confined Space Entry sign on primary elliptical shell manway.			X		
9	Post Confined Space Entry sign on secondary shell manway.			X		
10	Install a flapper valve and new screen on the overflow pipe.		X			
11	Install a compliant exterior shell access ladder complete with standoffs every 10' on center.			X		
	Install a cable type ladder safety device on exterior shell access ladder.			X		
	Install a lockable ladder guard on exterior shell access ladder.					X
	Post Fall Protection Required sign at base of exterior shell access ladder.			X		
12	Remove the co/ax from the exterior shell access ladder and secure it to the tank shell with standoffs.			X		
13	Install a float-type liquid level indicator.		X			
14	Extend the handrails around the circumference of the tank roof, complete with intermediate rail, toeboard and a swing gate at the junction of the shell-to-roof access ladder and tank roof.			X		
15	Install 30" secondary roof hatch 180° from primary hatch.		X	X		
	Post Confined Space Entry sign on primary roof hatch.			X		
	Install compliant interior access ladders complete with standoffs every 10' on center at the primary and suggested secondary roof hatches. <i>In cold climates it's up to the owner's discretion on placement of internal ladders.</i>			X		
	Install cable type ladder safety devices on primary and secondary interior access ladders.			X		

Page #	Work Proposed	Critical Deficiency	NON-Critical Deficiency	OSHA	Structural	Preventive Maintenance
17	Pressure wash the tank exterior with biodegradable detergent injection (minimum 3,500 psi at 3.0 gpm) then remove all loose rust and scale with wire brushes and hand scrapers in accordance with SSPC#2 (hand tool cleaning), spot prime and apply one (1) finish coat of acrylic paint.					X
18	Seam seal all un-welded interior roof seams using Sikaflex® 1a.					X
19	Install a mixing system. Electrical work to be done by others if required.		X			
20	Perform a robotic in-service interior cleanout, up to 3" of sediment. This work should be performed on an emergency basis. Additional accumulation will be \$300 per hour to remove. In the event the tank has to be drained, it should be drained by the owner prior to our arrival.	X				
	Install a passive cathodic protection system.					X
21	Sandblast all rusted and abraded interior areas to SSPC-SP10 (near white), and brush blast all remaining interior areas to SSPC-SP7; then apply one (1) spot coat of epoxy primer to all areas sandblasted to #10, stripe coat all weld seams, and apply one (1) full coat of epoxy to the entire tank, to achieve 8 to 10 mils of total dry film thickness. Total mil thickness will include a combination of the existing and new coating.					X

APPENDIX B

Sections of Massachusetts General Law

CHAPTER 30. GENERAL PROVISIONS RELATIVE TO STATE DEPARTMENTS, COMMISSIONS, OFFICERS AND EMPLOYEES

Chapter 30: Section 39F. Construction contracts; assignment and subrogation; subcontractor defined; enforcement of claim for direct payment; deposit, reduction of disputed amounts

Section 39F. (1) Every contract awarded pursuant to sections forty-four A to L, inclusive, of chapter one hundred and forty-nine shall contain the following subparagraphs (a) through (i) and every contract awarded pursuant to section thirty-nine M of chapter thirty shall contain the following subparagraphs (a) through (h) and in each case those subparagraphs shall be binding between the general contractor and each subcontractor.

(a) Forthwith after the general contractor receives payment on account of a periodic estimate, the general contractor shall pay to each subcontractor the amount paid for the labor performed and the materials furnished by that subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(b) Not later than the sixty-fifth day after each subcontractor substantially completes his work in accordance with the plans and specifications, the entire balance due under the subcontract less amounts retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, shall be due the subcontractor; and the awarding authority shall pay that amount to the general contractor. The general contractor shall forthwith pay to the subcontractor the full amount received from the awarding authority less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the subcontractor by the general contractor.

(c) Each payment made by the awarding authority to the general contractor pursuant to subparagraphs (a) and (b) of this paragraph for the labor performed and the materials furnished by a subcontractor shall be made to the general contractor for the account of that subcontractor; and the awarding authority shall take reasonable steps to compel the general contractor to make each such payment to each such subcontractor. If the awarding authority has received a demand for direct payment from a subcontractor for any amount which has already been included in a payment to the general contractor or which is to be included in a payment to the general contractor for payment to the subcontractor as provided in subparagraphs (a) and (b), the awarding authority shall act upon the demand as provided in this section.

(d) If, within seventy days after the subcontractor has substantially completed the subcontract work, the subcontractor has not received from the general contractor the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount retained by the awarding authority as the estimated cost of completing the incomplete and unsatisfactory items of work, the

subcontractor may demand direct payment of that balance from the awarding authority. The demand shall be by a sworn statement delivered to or sent by certified mail to the awarding authority, and a copy shall be delivered to or sent by certified mail to the general contractor at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract work. Any demand made after substantial completion of the subcontract work shall be valid even if delivered or mailed prior to the seventieth day after the subcontractor has substantially completed the subcontract work. Within ten days after the subcontractor has delivered or so mailed the demand to the awarding authority and delivered or so mailed a copy to the general contractor, the general contractor may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the awarding authority and a copy shall be delivered to or sent by certified mail to the subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor and of the amount due for each claim made by the general contractor against the subcontractor.

(e) Within fifteen days after receipt of the demand by the awarding authority, but in no event prior to the seventieth day after substantial completion of the subcontract work, the awarding authority shall make direct payment to the subcontractor of the balance due under the subcontract including any amount due for extra labor and materials furnished to the general contractor, less any amount (i) retained by the awarding authority as the estimated cost of completing the incomplete or unsatisfactory items of work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the general contractor in the sworn reply; provided, that the awarding authority shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d). The awarding authority shall make further direct payments to the subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this subparagraph.

(f) The awarding authority shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) in an interest-bearing joint account in the names of the general contractor and the subcontractor in a bank in Massachusetts selected by the awarding authority or agreed upon by the general contractor and the subcontractor and shall notify the general contractor and the subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the general contractor and the subcontractor or as determined by decree of a court of competent jurisdiction.

(g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to subparagraph (f) shall be made out of amounts payable to the general contractor at the time of receipt of a demand for direct payment from a subcontractor and out of amounts which later become payable to the general contractor and in the order of receipt of such demands from subcontractors.

All direct payments shall discharge the obligation of the awarding authority to the general contractor to the extent of such payment.

(h) The awarding authority shall deduct from payments to a general contractor amounts which, together with the deposits in interest-bearing accounts pursuant to subparagraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from subcontractors. All such amounts shall be earmarked for such direct payments, and the subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the general contractor.

(i) If the subcontractor does not receive payment as provided in subparagraph (a) or if the general contractor does not submit a periodic estimate for the value of the labor or materials performed or furnished by the subcontractor and the subcontractor does not receive payment for same when due less the deductions provided for in subparagraph (a), the subcontractor may demand direct payment by following the procedure in subparagraph (d) and the general contractor may file a sworn reply as provided in that same subparagraph. A demand made after the first day of the month following that for which the subcontractor performed or furnished the labor and materials for which the subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the general contractor. Thereafter the awarding authority shall proceed as provided in subparagraph (e), (f), (g) and (h).

(2) Any assignment by a subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of section twenty-nine of chapter one hundred forty-nine shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the awarding authority or which are on deposit pursuant to subparagraph (f) of paragraph (1) shall be subordinate to the rights of all subcontractors who are entitled to be paid under this section and who have not been paid in full.

(3) "Subcontractor" as used in this section (i) for contracts awarded as provided in sections forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall mean a person who files a sub-bid and receives a subcontract as a result of that filed sub-bid or who is approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, (ii) for contracts awarded as provided in paragraph (a) of section thirty-nine M of chapter thirty shall mean a person approved by the awarding authority in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the general contractor, and (iii) for contracts with the commonwealth not awarded as provided in forty-four A to forty-four H, inclusive, of chapter one hundred forty-nine shall also mean a person contracting with the general contractor to supply materials used or employed in a public works project for a price in excess of five thousand dollars.

(4) A general contractor or a subcontractor shall enforce a claim to any portion of the amount of a demand for direct payment deposited as provided in subparagraph (f) of

paragraph 1 by a petition in equity in the superior court against the other and the bank shall not be a necessary party. A subcontractor shall enforce a claim for direct payment or a right to require a deposit as provided in subparagraph (f) of paragraph 1 by a petition in equity in the superior court against the awarding authority and the general contractor shall not be a necessary party. Upon motion of any party the court shall advance for speedy trial any petition filed as provided in this paragraph. Sections fifty-nine and fifty-nine B of chapter two hundred thirty-one shall apply to such petitions. The court shall enter an interlocutory decree upon which execution shall issue for any part of a claim found due pursuant to sections fifty-nine and fifty-nine B and, upon motion of any party, shall advance for speedy trial the petition to collect the remainder of the claim. Any party aggrieved by such interlocutory decree shall have the right to appeal therefrom as from a final decree. The court shall not consolidate for trial the petition of any subcontractor with the petition of one or more subcontractors or the same general contract unless the court finds that a substantial portion of the evidence of the same events during the course of construction (other than the fact that the claims sought to be consolidated arise under the same general contract) is applicable to the petitions sought to be consolidated and that such consolidation will prevent unnecessary duplication of evidence. A decree in any such proceeding shall not include interest on the disputed amount deposited in excess of the interest earned for the period of any such deposit. No person except a subcontractor filing a demand for direct payment for which no funds due the general contractor are available for direct payment shall have a right to file a petition in court of equity against the awarding authority claiming a demand for direct payment is premature and such subcontractor must file the petition before the awarding authority has made a direct payment to the subcontractor and has made a deposit of the disputed portion as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1).

(5) In any petition to collect any claim for which a subcontractor has filed a demand for direct payment the court shall, upon motion of the general contractor, reduce by the amount of any deposit of a disputed amount by the awarding authority as provided in part (iii) of subparagraph (e) and in subparagraph (f) of paragraph (1) any amount held under a trustee writ or pursuant to a restraining order or injunction.

Chapter 30: Section 39K. Public building construction contracts; payments

Section 39K. Every contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building by the commonwealth, or by any county, city, town, district, board, commission or other public body, when the amount is more than five thousand dollars in the case of the commonwealth and more than two thousand dollars in the case of any county, city, town, district, board, commission or other public body, shall contain the following paragraph:— Within fifteen days (30 days in the case of the commonwealth, including local housing authorities) after receipt from the contractor, at the place designated by the awarding authority if such a place is so designated, of a periodic estimate requesting payment of the amount due for the preceding month, the awarding authority will make a periodic payment to the contractor for the work

performed during the preceding month and for the materials not incorporated in the work but delivered and suitably stored at the site (or at some location agreed upon in writing) to which the contractor has title or to which a subcontractor has title and has authorized the contractor to transfer title to the awarding authority, upon certification by the contractor that he is the lawful owner and that the materials are free from all encumbrances, but less (1) a retention based on its estimate of the fair value of its claims against the contractor and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, and less (3) a retention not exceeding five per cent of the approved amount of the periodic payment. After the receipt of a periodic estimate requesting final payment and within sixty-five days after (a) the contractor fully completes the work or substantially completes the work so that the value of the work remaining to be done is, in the estimate of the awarding authority, less than one per cent of the original contract price, or (b) the contractor substantially completes the work and the awarding authority takes possession for occupancy, whichever occurs first, the awarding authority shall pay the contractor the entire balance due on the contract less (1) a retention based on its estimate of the fair value of its claims against the contractor and of the cost of completing the incomplete and unsatisfactory items of work and less (2) a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section thirty-nine F, or based on the record of payments by the contractor to the subcontractors under this contract if such record of payment indicates that the contractor has not paid subcontractors as provided in section thirty-nine F. If the awarding authority fails to make payment as herein provided, there shall be added to each such payment daily interest at the rate of three percentage points above the rediscount rate than charged by the Federal Reserve Bank of Boston commencing on the first day after said payment is due and continuing until the payment is delivered or mailed to the contractor; provided, that no interest shall be due, in any event, on the amount due on a periodic estimate for final payment until fifteen days (twenty-four days in the case of the commonwealth) after receipt of such a periodic estimate from the contractor, at the place designated by the awarding authority if such a place is so designated. The contractor agrees to pay to each subcontractor a portion of any such interest paid in accordance with the amount due each subcontractor.

The awarding authority may make changes in any periodic estimate submitted by the contractor and the payment due on said periodic estimate shall be computed in accordance with the changes so made, but such changes or any requirement for a corrected periodic estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided, that the awarding authority may, within seven days after receipt, return to the contractor for correction, any periodic estimate which is not in the required form or which contains computations not arithmetically correct and, in that event, the date of receipt of such periodic estimate shall be the date of receipt of the corrected periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic estimate received on a Saturday shall be the first working day thereafter. The provisions of section thirty-nine G shall not apply to any contract for the construction,

reconstruction, alteration, remodeling, repair or demolition of any public building to which this section applies.

All periodic estimates shall be submitted to the awarding authority, or to its designee as set forth in writing to the contractor, and the date of receipt by the awarding authority or its designee shall be marked on the estimate. All periodic estimates shall contain a separate item for each filed subtrade and each sub-subtrade listed in sub-bid form as required by specifications and a column listing the amount paid to each subcontractor and sub-subcontractor as of the date the periodic estimate is filed. The person making payment for the awarding authority shall add the daily interest provided for herein to each payment for each day beyond the due date based on the date of receipt marked on the estimate.

A certificate of the architect to the effect that the contractor has fully or substantially completed the work shall, subject to the provisions of section thirty-nine J, be conclusive for the purposes of this section.

Notwithstanding the provisions of this section, at any time after the value of the work remaining to be done is, in the estimation of the awarding authority, less than 1 per cent of the adjusted contract price, or the awarding authority has determined that the contractor has substantially completed the work and the awarding authority has taken possession for occupancy, the awarding authority may send to the general contractor by certified mail, return receipt requested, a complete and final list of all incomplete and unsatisfactory work items, including, for each item on the list, a good faith estimate of the fair and reasonable cost of completing such item. The general contractor shall then complete all such work items within 30 days of receipt of such list or before the contract completion date, whichever is later. If the general contractor fails to complete all incomplete and unsatisfactory work items within 45 days after receipt of such items furnished by the awarding authority or before the contract completion date, whichever is later, subsequent to an additional 14 days' written notice to the general contractor by certified mail, return receipt requested, the awarding authority may terminate the contract and complete the incomplete and unsatisfactory work items and charge the cost of same to the general contractor and such termination shall be without prejudice to any other rights or remedies the awarding authority may have under the contract. The awarding authority shall note any such termination in the evaluation form to be filed by the awarding authority pursuant to the provisions of section 44D of chapter 149.

Chapter 30: Section 39N. Construction contracts; equitable adjustment in contract price for differing subsurface or latent physical conditions

Section 39N. Every contract subject to section forty-four A of chapter one hundred and forty-nine or subject to section thirty-nine M of chapter thirty shall contain the following paragraph in its entirety and an awarding authority may adopt reasonable rules or

regulations in conformity with that paragraph concerning the filing, investigation and settlement of such claims:

If, during the progress of the work, the contractor or the awarding authority discovers that the actual subsurface or latent physical conditions encountered at the site differ substantially or materially from those shown on the plans or indicated in the contract documents either the contractor or the contracting authority may request an equitable adjustment in the contract price of the contract applying to work affected by the differing site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a contractor, or upon its own initiative, the contracting authority shall make an investigation of such physical conditions, and, if they differ substantially or materially from those shown on the plans or indicated in the contract documents or from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the plans and contract documents and are of such a nature as to cause an increase or decrease in the cost of performance of the work or a change in the construction methods required for the performance of the work which results in an increase or decrease in the cost of the work, the contracting authority shall make an equitable adjustment in the contract price and the contract shall be modified in writing accordingly.

Chapter 30: Section 39O. Contracts for construction and materials; suspension, delay or interruption due to order of awarding authority; adjustment in contract price; written claim

Section 39O. Every contract subject to the provisions of section thirty-nine M of this chapter or subject to section forty-four A of chapter one hundred forty-nine shall contain the following provisions (a) and (b) in their entirety and, in the event a suspension, delay, interruption or failure to act of the awarding authority increases the cost of performance to any subcontractor, that subcontractor shall have the same rights against the general contractor for payment for an increase in the cost of his performance as provisions (a) and (b) give the general contractor against the awarding authority, but nothing in provisions (a) and (b) shall in any way change, modify or alter any other rights which the general contractor or the subcontractor may have against each other.

(a) The awarding authority may order the general contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as it may determine to be appropriate for the convenience of the awarding authority; provided however, that if there is a suspension, delay or interruption for fifteen days or more or due to a failure of the awarding authority to act within the time specified in this contract, the awarding authority shall make an adjustment in the contract price for any increase in the cost of performance of this contract but shall not include any profit to the general contractor on such increase; and provided further, that the awarding authority shall not make any adjustment in the contract price under this provision for any suspension, delay, interruption or failure to act

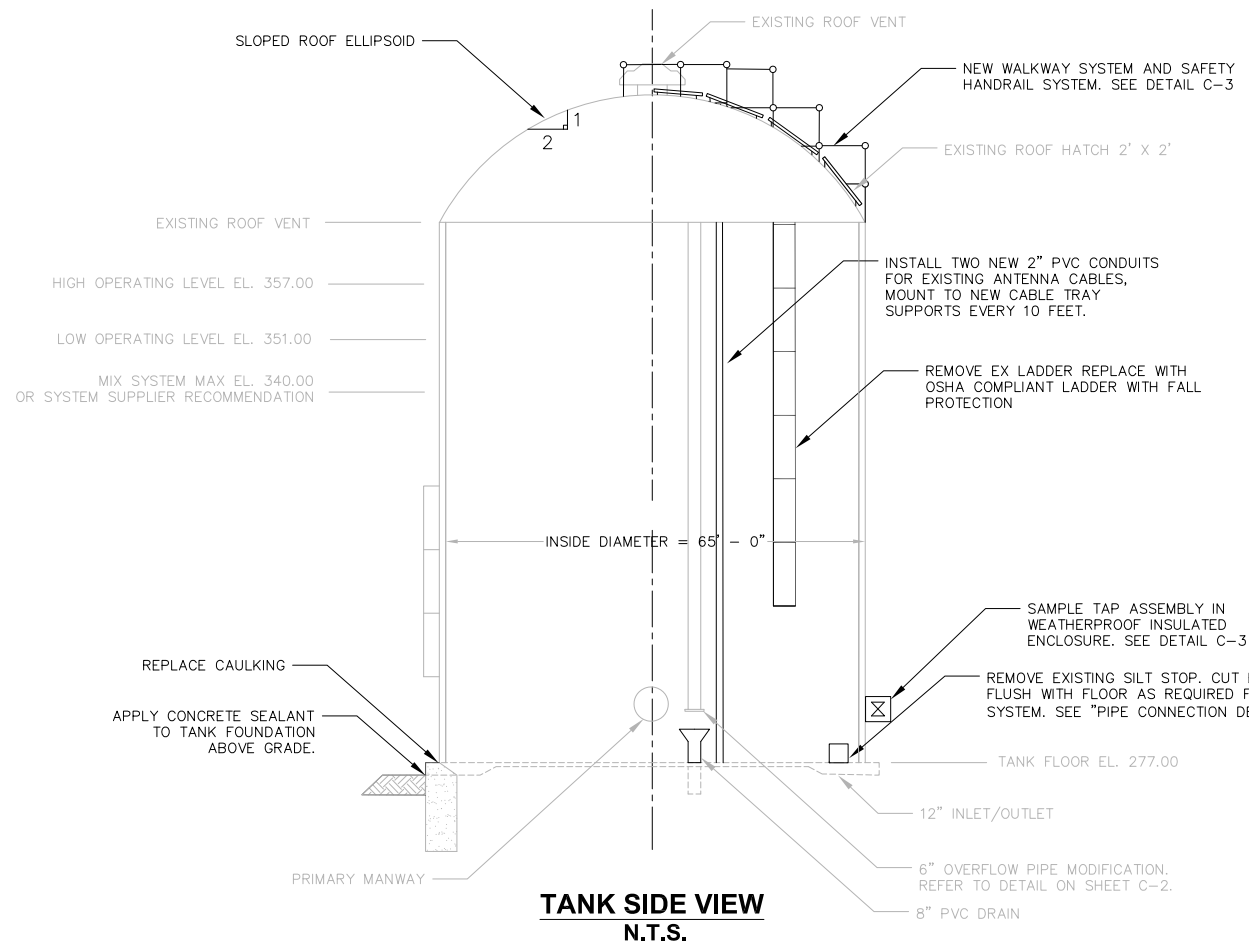
to the extent that such is due to any cause for which this contract provides for an equitable adjustment of the contract price under any other contract provisions.

(b) The general contractor must submit the amount of a claim under provision (a) to the awarding authority in writing as soon as practicable after the end of the suspension, delay, interruption or failure to act and, in any event, not later than the date of final payment under this contract and, except for costs due to a suspension order, the awarding authority shall not approve any costs in the claim incurred more than twenty days before the general contractor notified the awarding authority in writing of the act or failure to act involved in the claim.

APPENDIX C

Contract Drawings

- C-1: Cedarwood Water Storage Tank Rehabilitation Project – Site Plan and Section
- C-2: Cedarwood Water Storage Tank Rehabilitation Project – Details - I
- C-3: Cedarwood Water Storage Tank Rehabilitation Project – Details - II



- GENERAL NOTES:**
1. ALL APPURTENANCES SHOWN ARE DIAGRAMMATIC. FIELD VERIFY EXISTING CONDITIONS AND DIMENSIONS PRIOR TO FABRICATION.
 2. REMOVE AND TEMPORARILY RELOCATE (2) COMMUNICATION ANTENNAS.
 3. ANTENNAS FOR FIRE/POLICE MUST REMAIN FULLY FUNCTIONAL THROUGHOUT PROJECT.
 4. REINSTALL ANTENNAS WITH STANDOFF MOUNTING EQUIPMENT ON NEW SAFETY RAIL POSTS TO BE FIELD LOCATED. SUBMIT SHOP DRAWING PROPOSED MOUNTING SYSTEM.
 5. COORDINATE WITH OWNER AND POLICE/FIRE
 6. DECOMMISSION: CLOSE VALVE AND REMOVE BOX, FILL IN HOLE.
 7. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL INSTALL EROSION CONTROLS AND 50 FT (L) STABILIZED STONE CONSTRUCTION ENTRANCE. MAINTAIN FOR THE DURATION OF THE TANK REHABILITATION PROJECTS.
 8. SILT SOCK SHALL BE INSTALLED DOWN GRADE OF CONSTRUCTION LIMITS AS NEEDED TO CONTROL EROSION AND SEDIMENT DURING CONSTRUCTION.
 9. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING HIS WORK.
 10. THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO DESCRIBE AN EQUIPMENT INSTALLATION, BUT DO NOT PURPORT TO COVER ALL DETAILS NEEDED FOR A COMPLETE SYSTEM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DETAILS THAT MAY BE NECESSARY TO PROPERLY INSTALL, ADJUST, AND PLACE INTO OPERATION THE INSTALLATION INCLUDING ALL COORDINATION WITH SUBCONTRACTORS AND EQUIPMENT SUPPLIERS. THE CONTRACTOR WILL BE SOLELY RESPONSIBLE FOR PROVIDING A FULLY FUNCTIONAL SYSTEM.

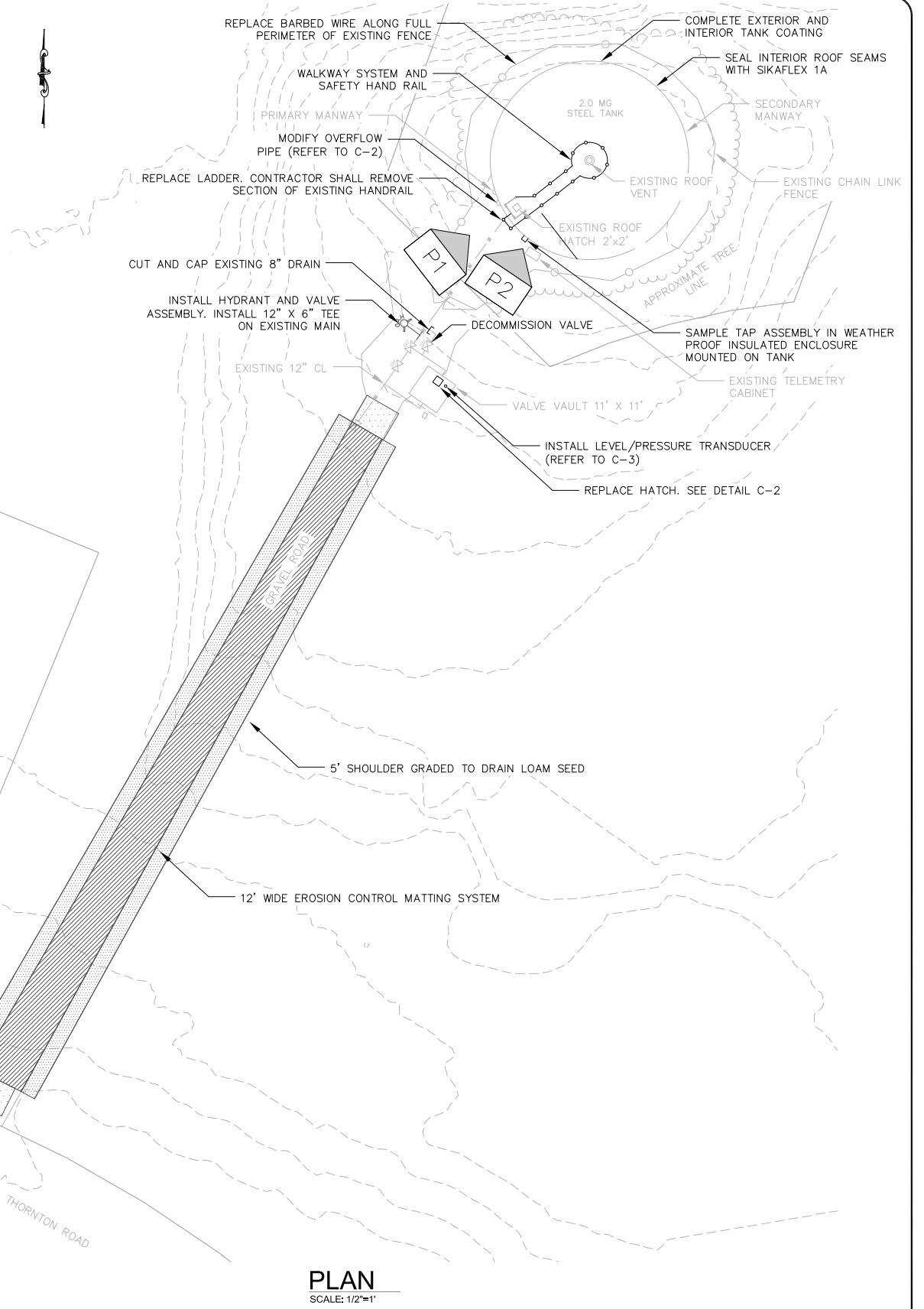


PHOTO 1
SCALE: N.T.S.

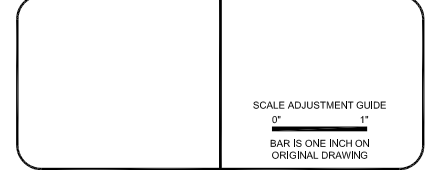


PHOTO 2
SCALE: N.T.S.

PLAN
SCALE: 1/2"=1'

FOR BIDDING

11/22/22 Drawing: Cedarwood.dwg
www.h2olsonsengineering.com (508) 375-7007



REVISIONS		
NO.	DATE	DESCRIPTION

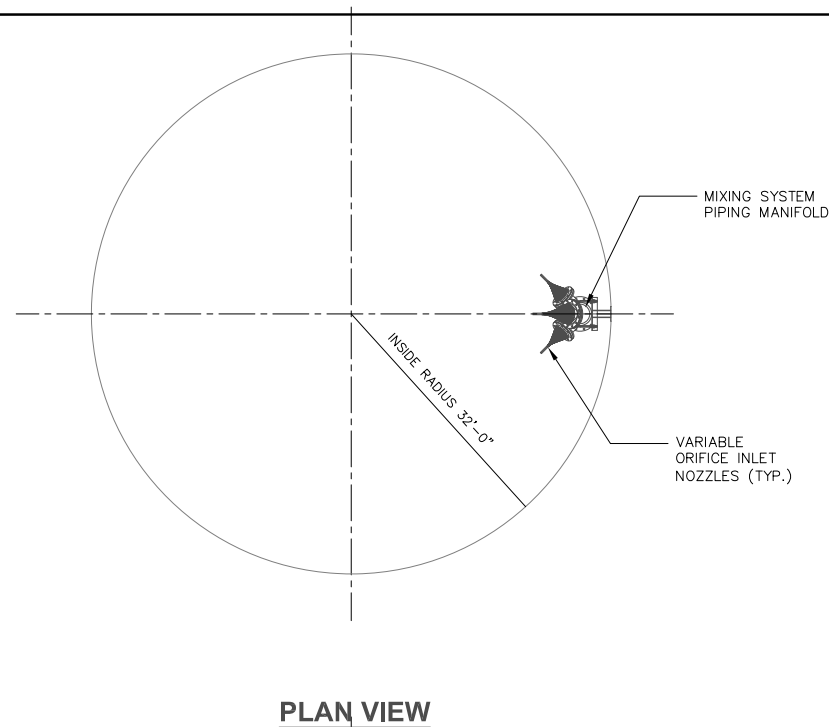


PROJECT NO: 112.22.02
DATE: JANUARY 2024
SCALE: AS SHOWN
DESIGNED BY: DMW
CHECKED BY: SCO
DRAWN BY: CAP
APPROVED BY: SCO

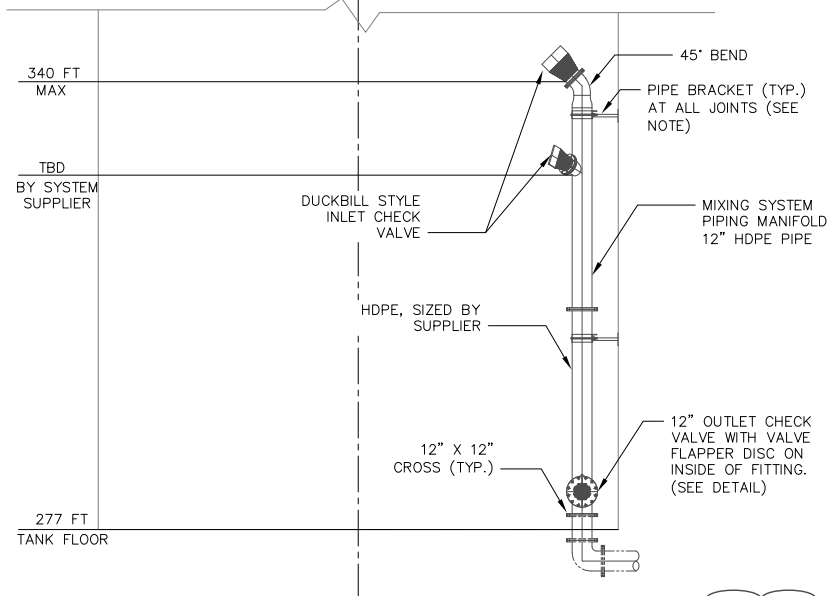
**CEDARWOOD WATER STORAGE
TANK REHABILITATION PROJECT**
WALTHAM, MASSACHUSETTS

DRAWING TITLE:
**TANK SITE PLAN
AND SECTION**

DRAWING NO.:
C-1
SHEET NO. 1 OF 3



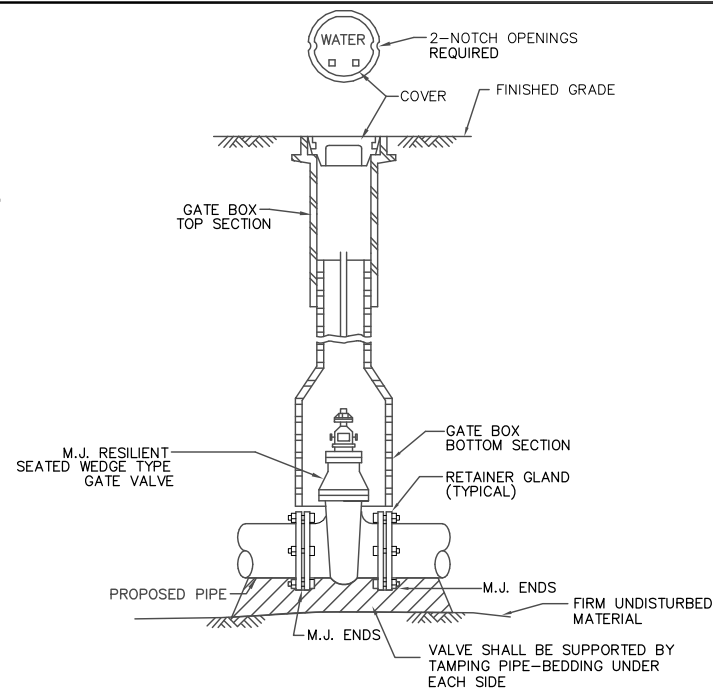
PLAN VIEW



SECTION VIEW

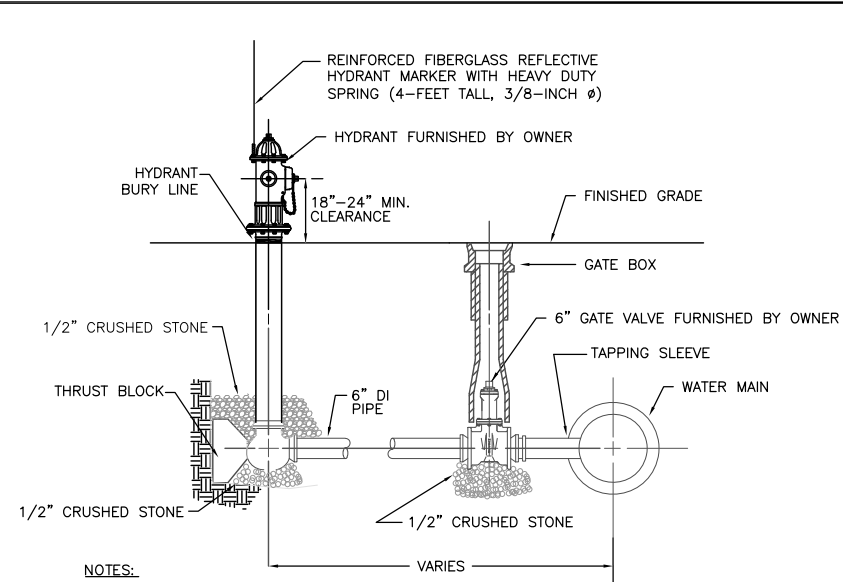
NOTE:
1. PIPE SUPPORT SYSTEM TO BE DESIGNED BY SUPPLIER.

TANK MIXING SYSTEM
SCALE: N.T.S.



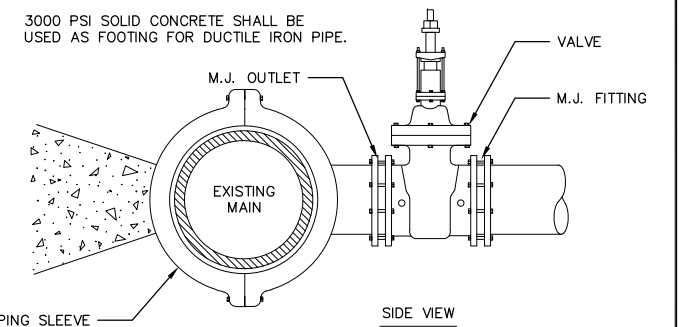
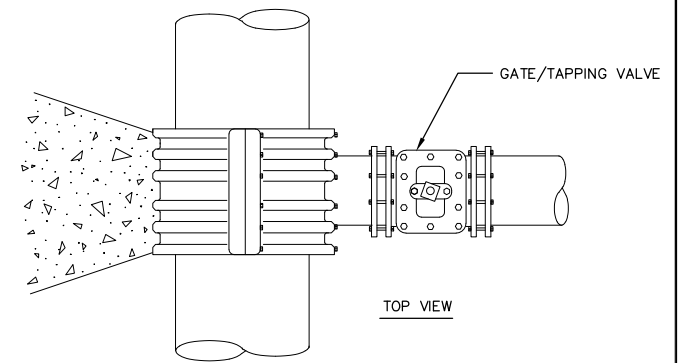
NOTE:
1. ONE (1) 6" VALVE WILL BE SUPPLIED BY OWNER

GATE VALVE AND VALVE BOX DETAIL
SCALE: NOT TO SCALE



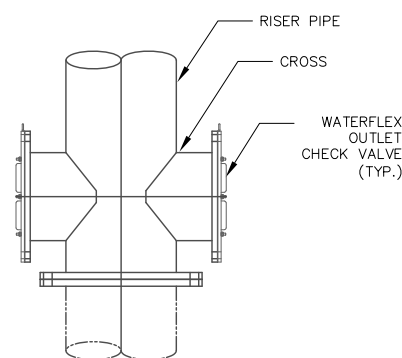
NOTES:
1. ALL HYDRANT, VALVE, AND TEE JOINTS TO BE RESTRAINED MECHANICAL JOINTS.
2. DEPTH OF HYDRANT BURY SHALL SUIT INSTALLED DEPTH OF COVER OVER WATER MAIN. INSTALL RISERS AS NECESSARY AT NO ADDITIONAL COST TO THE OWNER.

HYDRANT ASSEMBLY DETAIL
SCALE: NOT TO SCALE

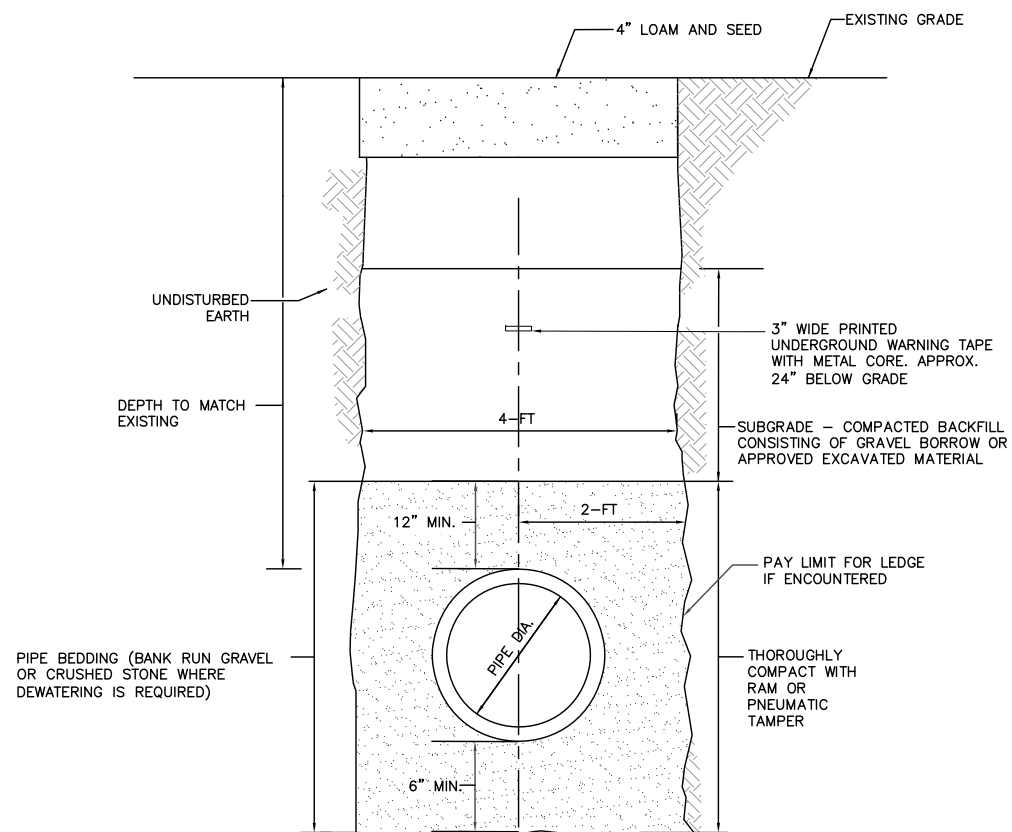


NOTES:
1. CONCRETE SHALL NOT CONTACT BOLTS OR ENDS OF MECHANICAL JOINT FITTINGS.
2. SEE THRUST BLOCK DETAILS FOR AREA OF CONCRETE REQUIRED.

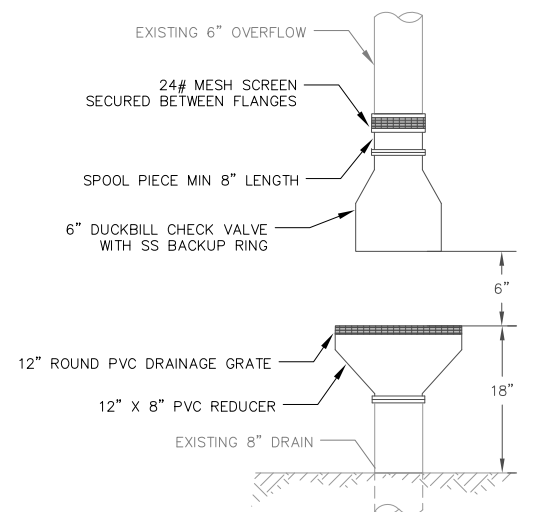
STANDARD TAPPING SLEEVE AND VALVE ASSEMBLY
SCALE: NOT TO SCALE



OUTLET CHECK VALVE
SCALE: N.T.S.



TYPICAL TRENCH DETAIL
SCALE: NOT TO SCALE



NOTES:
1. CUT EXISTING 6" OVERFLOW TO ACHIEVE CLEARANCE OF 24" FROM GRADE TO CHECK VALVE
2. INSTALL 6" FLANGE ADAPTER, DI, 316 SS BOLTS
3. CUT EXISTING 8" PVC DRAIN AND INSTALL 12" X 8" REDUCER

OVERFLOW PIPE MODIFICATIONS
SCALE: N.T.S.

FOR BIDDING

REVISIONS		
NO.	DATE	DESCRIPTION



PROJECT NO.: 112.22.02
DATE: JANUARY 2024
SCALE: AS SHOWN
DESIGNED BY: DMW
CHECKED BY: SCO
DRAWN BY: CAP
APPROVED BY: SCO

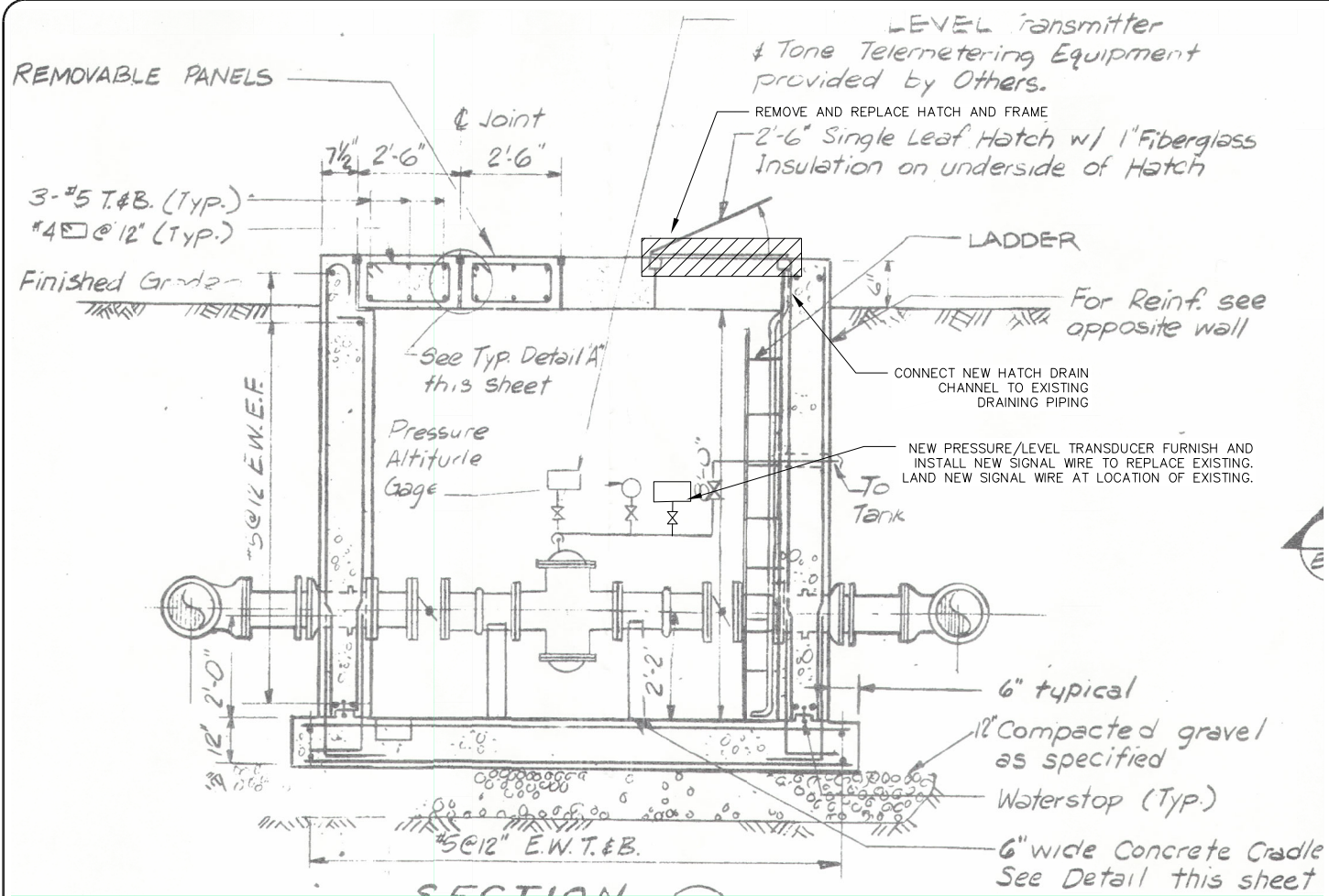
**CEDARWOOD WATER STORAGE
TANK REHABILITATION PROJECT**

WALTHAM, MASSACHUSETTS

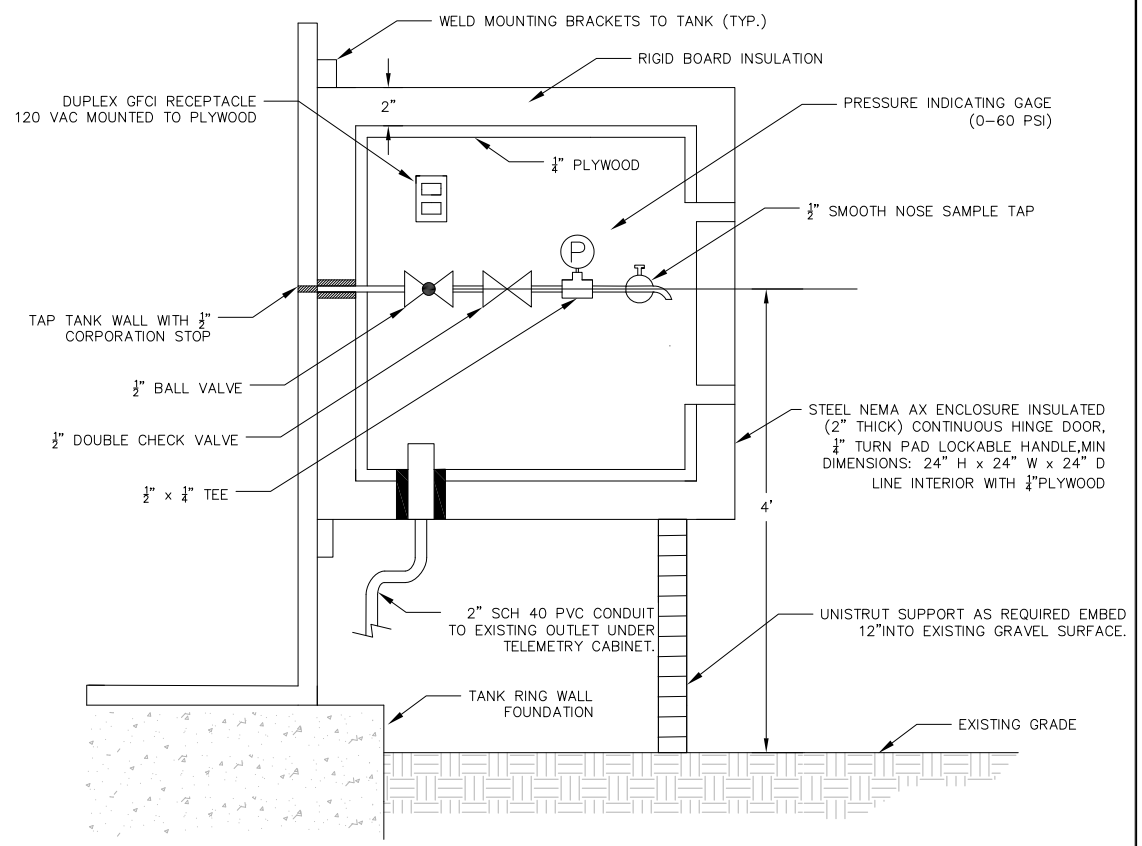
DRAWING TITLE:
TANK DETAILS - I

DRAWING NO.:
C-2

SHEET NO. 2 OF 3

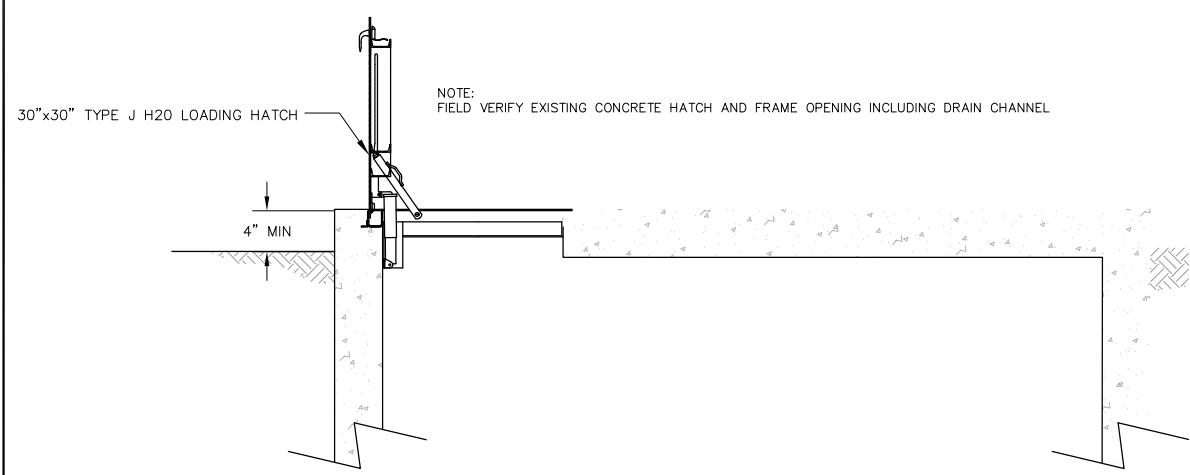


VALVE VAULT MODIFICATIONS
 SCALE: NOT TO SCALE

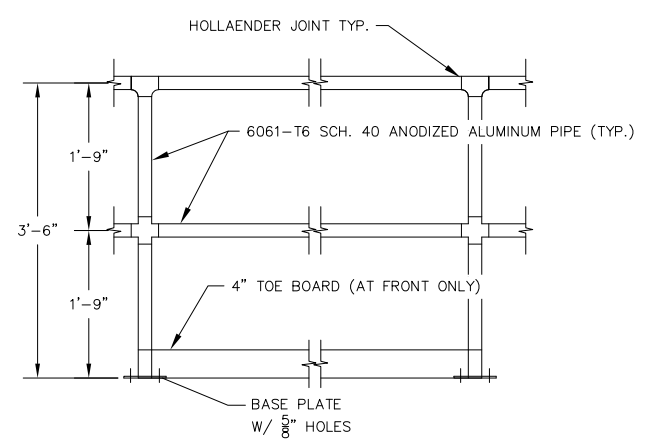


NOTES:
 1. FIELD VERIFY SAMPLE TAP LOCATION
 2. SUBMIT SHOP DRAWINGS WITH ENCLOSURE LAYOUT, DIMENSIONS, AND MATERIALS
 3. FITTINGS SHALL BE LEAD FREE BRASS OR COPPER
 4. FURNISH AND INSTALL 2" PVC CONDUIT FROM EXISTING ELECTRICAL SERVICE OUTLET UNDER TELEMETRY CABINET TO TANK SAMPLE TAP ENCLOSURE.

TANK SAMPLE TAP AND ENCLOSURE
 SCALE: N.T.S.

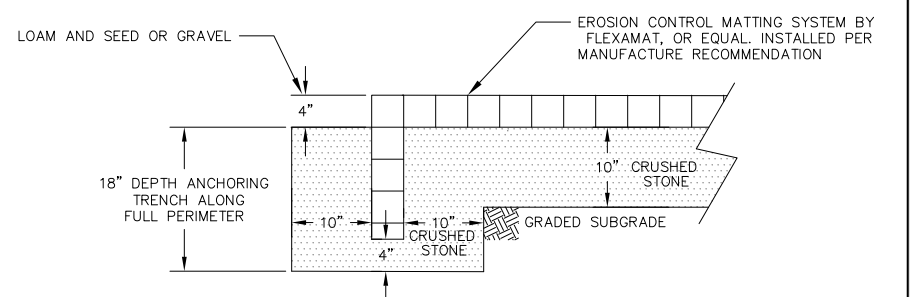


NEW 30' x 30' HATCH DETAIL
 SCALE: 3/4"=1'-0"



NOTES:
 1. S.S. WEDGE ANCHORS TO BE USED AT EACH HANDRAIL/TANK CONNECTION.
 2. FOUR INCH TOE BOARD TO BE PROVIDED

SAFETY RAIL DETAIL
 SCALE: NOT TO SCALE



EROSION CONTROL MATTING DETAIL SECTION
 N.T.S.

NOTE:
 1. ALL APPURTENANCES SHOWN ARE DIAGRAMMATIC. FIELD VERIFY EXISTING CONDITIONS AND DIMENSIONS PRIOR TO FABRICATION

FOR BIDDING

11/22/22 Drawings: Cedarwood.dwg

General Notes

www.h2oengineering.com
 (508) 375-7007

SCALE ADJUSTMENT GUIDE

0" 1"

BAR IS ONE INCH ON ORIGINAL DRAWING

REVISIONS		
NO.	DATE	DESCRIPTION



PROJECT NO.:	112.22.02
DATE:	JANUARY 2024
SCALE:	AS SHOWN
DESIGNED BY:	DMW
CHECKED BY:	SCO
DRAWN BY:	CAP
APPROVED BY:	SCO

**CEDARWOOD WATER STORAGE
 TANK REHABILITATION PROJECT**

WALTHAM, MASSACHUSETTS

DRAWING TITLE:
TANK DETAILS II

DRAWING NO.:

C-3

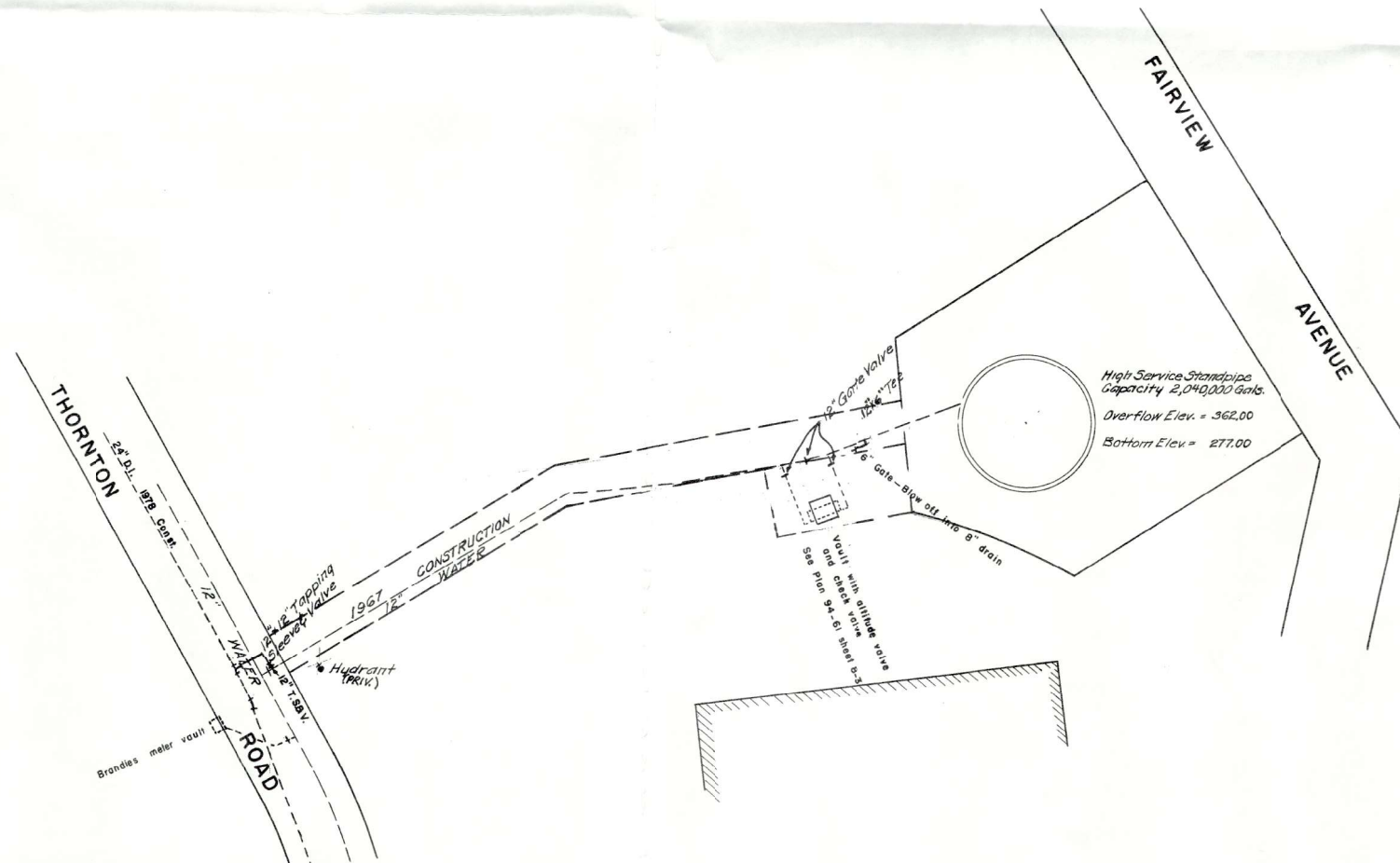
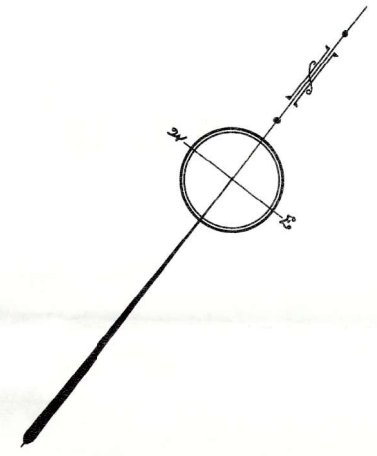
SHEET NO. 3 OF 3

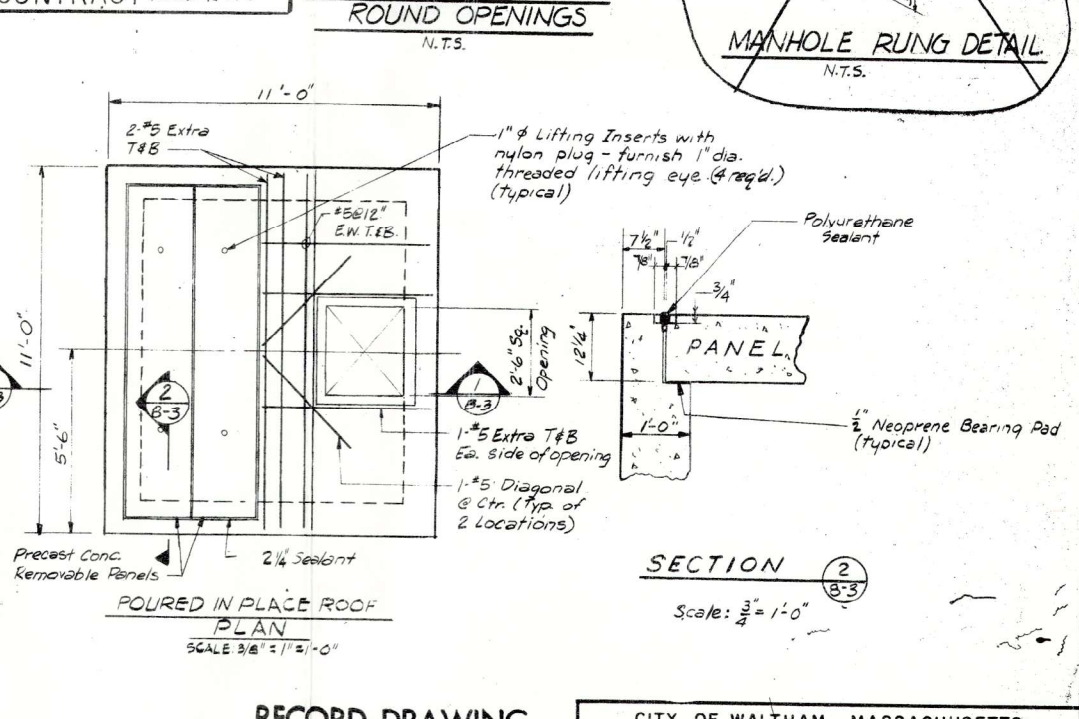
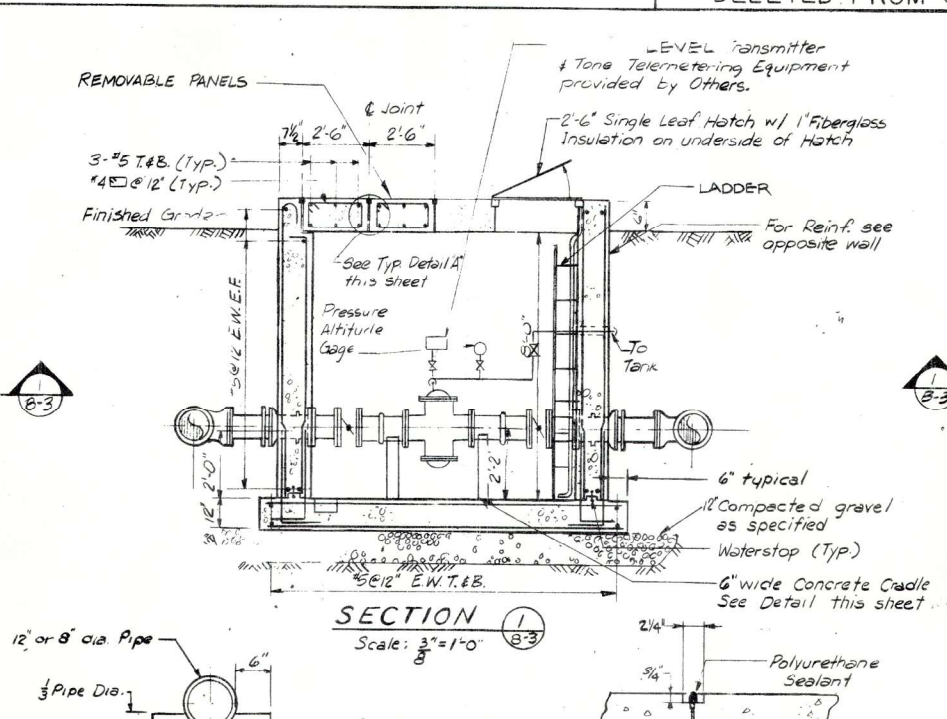
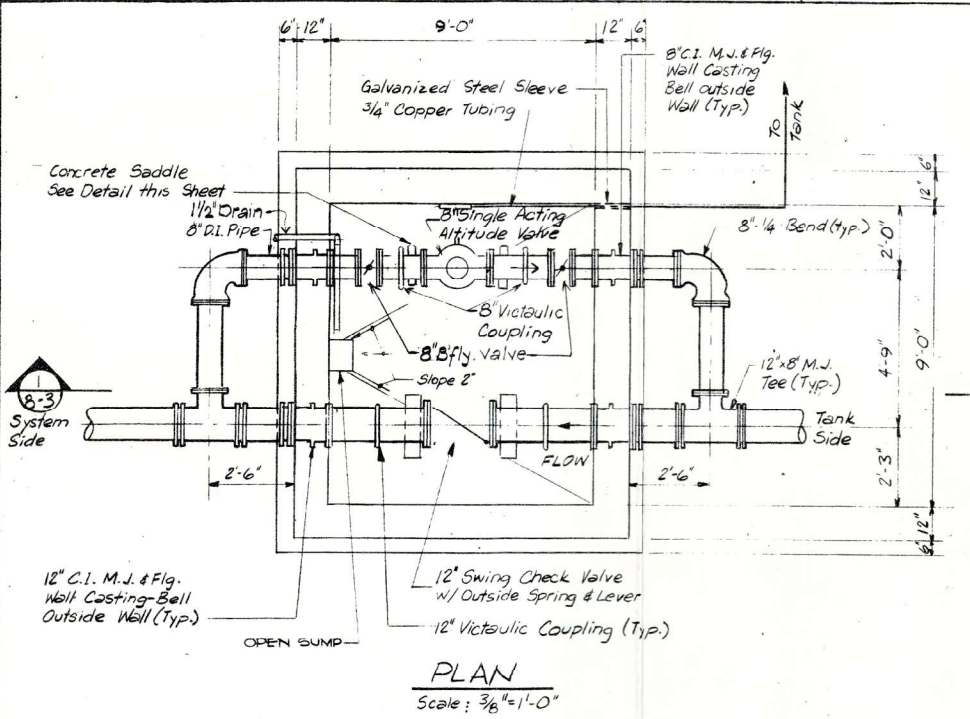
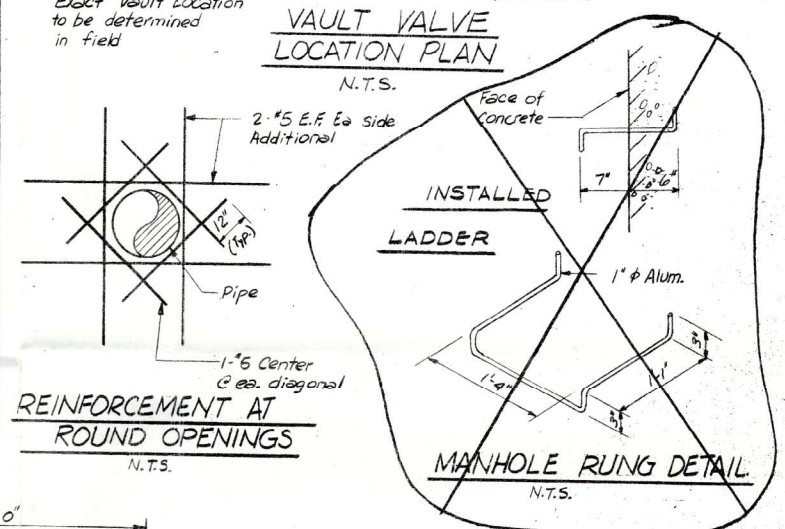
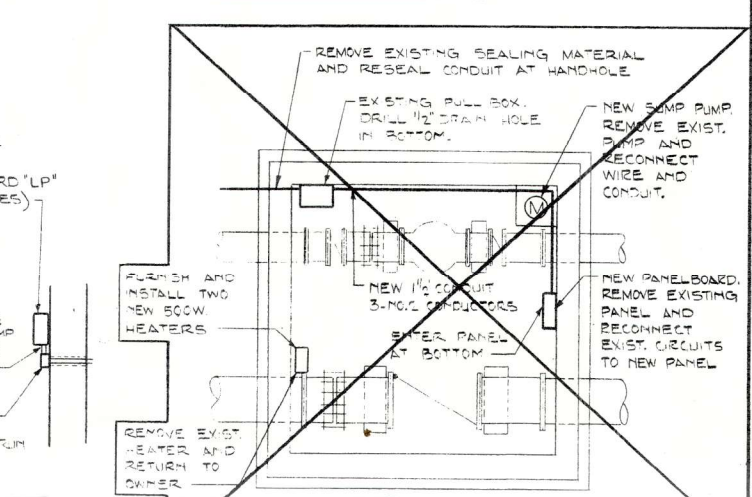
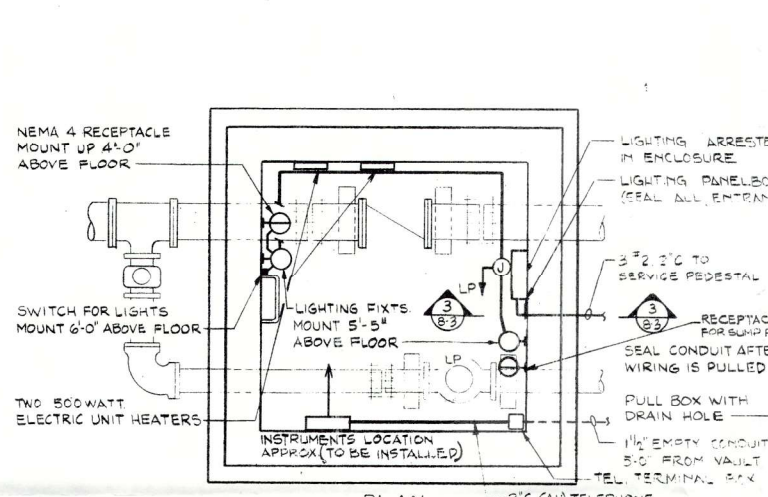
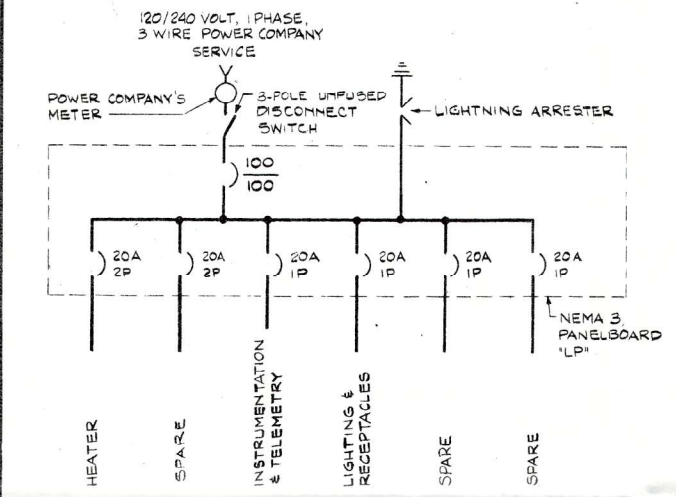
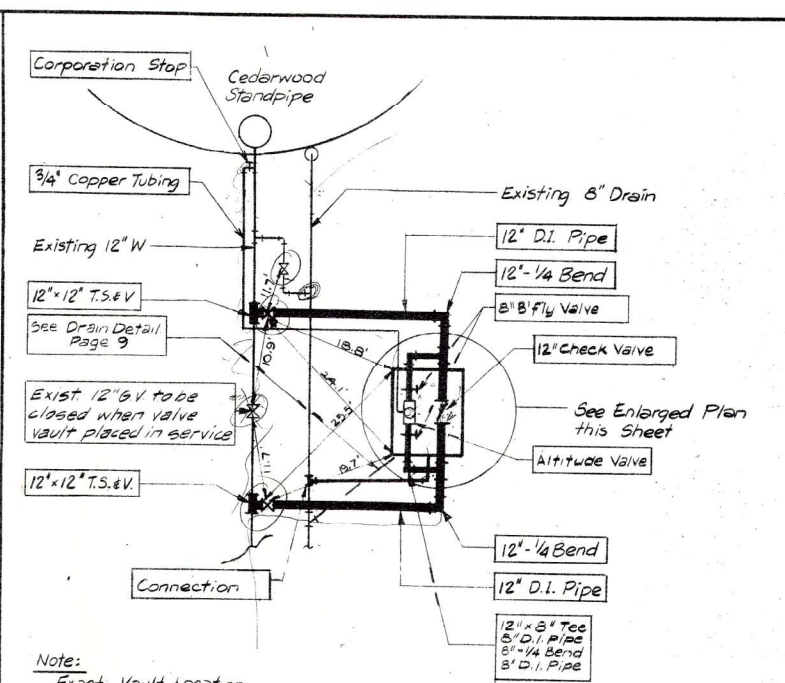
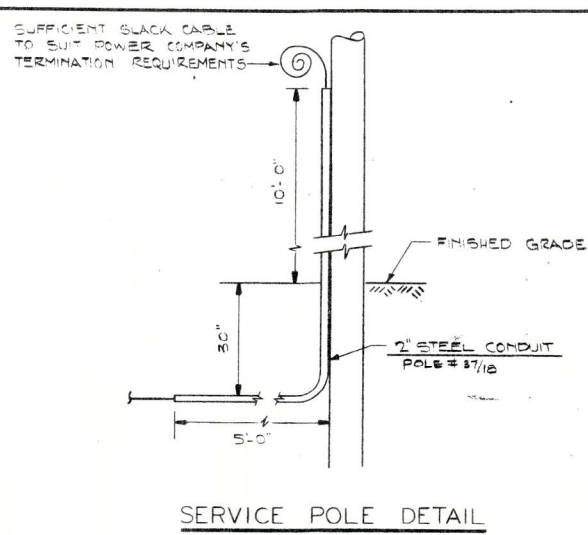
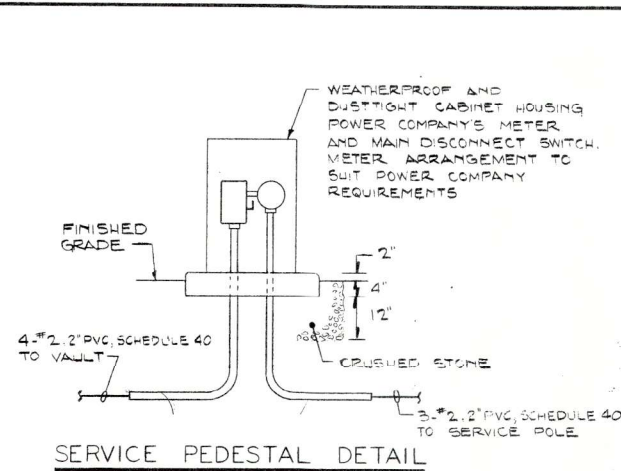
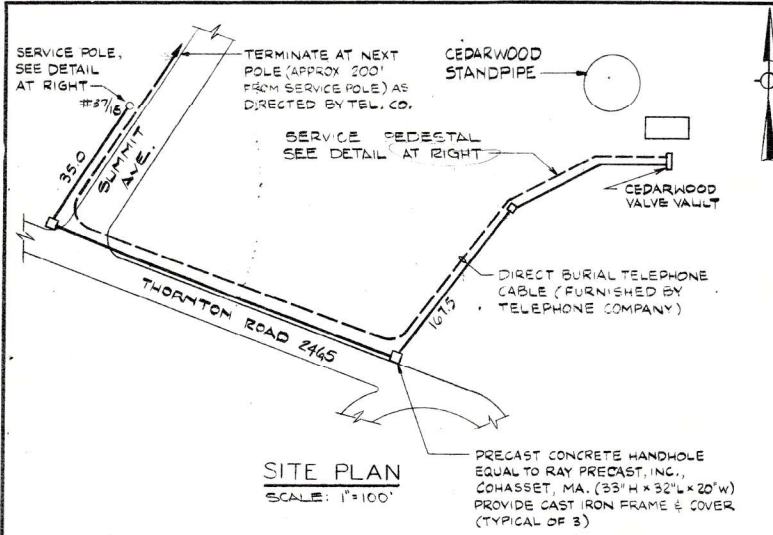
APPENDIX D

Record Drawings - 1979

CEDARWOOD HIGH SERVICE STAND PIPE

SCALES: 40 FEET HOR. & 4 FEET VERT PER IN.





Approved by:	Date	Name
Structural	5/18	R. Wood
Electrical	5/18	R. Carlson
HVAC		
Project Engineer	5/18	F. Hill
Project Manager	5/18	C. Miller

CONCRETE PIPE SADDLE
N.T.S.

TYPICAL DETAIL "A"
Scale: 3/4"=1'-0"

RECORD DRAWING

3/79	E.J.B.	Revised for record drawing
3/78	F.J.H.	Redesign Valve Vault
Date	Ch'k'd.	Revision
Designed by: D.L.D.		
Drawn by: P.A.E./G.C.	Date: July 1975	
Checked by: F.H.V.C.E.F.		
Approved by: T.P.R.	Scale: 1"=40'	

CITY OF WALTHAM, MASSACHUSETTS
WATER WORKS IMPROVEMENTS

CONTRACT NO 8
CEDARWOOD VALVE VAULT
DETAILS

CAMP DRESSER & McKEE Inc.
Consulting Engineers
Boston, Mass.

SHEET NO.
8-3
519-24277

APPENDIX E

Lead Paint Sampling Results



CERTIFICATE OF ANALYSIS

H2Olsen Engineering Inc
 Water Test
 10 Riverside Drive
 Lakeville, MA 02347

Project Name: Drinking Water
 Work Order Number: A2K0154
 Date Received: 11/03/2022

Sampled By: Lauren Blair
 Location: Cedarwood Tank Waltham

Date Sampled: 11/3/22 13:00
 Matrix: Solid

RESULTS OF ANALYSIS

Parameter	Analytical Method	Date Analyzed	Units	Detection Limit	DW MCL/ Recommended Limit #	Result
<i>Test Parameters</i>				LAB-ID#: A2K0154-01		
Lead	6010C	11/10/2022	mg/kg wet	32.3	---	36.0

NA = Not Applicable
 ND = Not Detected
 < = Less Than
 > = Greater Than

Approved By: 

Work Order Narrative:

No unusual observations noted.

Subcontracted Analyses:

ESS Laboratory - Cranston, RI (M-RI002)

Metals

REVIEWED
 By mgargasz at 12:33 pm, Nov 16, 2022

Work Order Number:

A2K0154



CHAIN OF CUSTODY

A2K0154



422 West Grove Street
Middleboro, MA 02346
Phone: 508-946-2225
www.h2otest.net
Lab I.D. #M-MA022

Client Name: H2Olson Engineering, Inc.	Project Name: Cedarwood Tank	ANALYSIS REQUIRED									
Address: 10 Riverdale Dr. Lakeville, MA 02347	Collected By: Lauren Blair	Lead	X								
Phone: 508-375-7007	<input checked="" type="checkbox"/> Paid in Full Check #: VISA										
Email List: lab@h2olsonengineering.com	<input type="checkbox"/> Pick-up <input type="checkbox"/> Sampled by lab \$50.00										

LAB ID	Collection		Matrix	Preservative	Composite	Grab	STATION LOCATION											
	Date	Time																
	11/3	1:00 PM	solid				Cedarwood Tank, Waltham	X										

LAB RESERVES THE RIGHT TO RETURN UNUSED PORTIONS OF NON-AQUEOUS SAMPLES TO CLIENT.

RELINQUISHED BY: Lauren Blair	DATE: 11/3/12	TIME: 2:55 PM	RECEIVED BY: Cheryl Whitnes	SAMPLE RECEIVING COMMENTS: LEFT VOICEMAIL FOR STEVE OLSON + ALSO SENT AN EMAIL ABOUT PAYMENT BEFORE SENDING SAMPLE TO ESS CAW
RELINQUISHED BY:	DATE:	TIME: 11:50	RECEIVED FOR LABORATORY BY:	

MATRIX CODES RW- REAGENT WATER SE- SEDIMENT DW- DRINKING WATER SL- SLUDGE GW- GROUND WATER HW- HAZARDOUS WASTE SW- SURFACE WATER WW- WASTE WATER SO- SOIL PW- POOL WATER	Normal Turn Around Time (TAT) is 7 to 10 Business Days starting first business day after receipt	SHIPPING CONDITIONS: (circle one) Iced or Ambient TEMPERATURE AT RECEIPT: _____ °C Client approval required for temperature >6°C
	Information will only be released to parties listed on this document.	<input type="checkbox"/> Approved by Client _____

**COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION**

Certified Parameter List as of: 19 OCT 2022

**M-MA022 ANALYTICAL BALANCE, DIV OF THIELSH ENG
MIDDLEBOROUGH MA**

NON POTABLE WATER (MICROBIOLOGY) Effective Date 01 JUL 2015 Expiration Date 30 JUN 2023

Analytes

E. COLI	AMBIENT WATER
E. COLI	AMBIENT WATER
ENTEROCOCCI	AMBIENT WATER
FECAL COLIFORM	WASTEWATER
E. COLI	WASTEWATER
ENTEROCOCCI	WASTEWATER

Methods

EPA 1603
EPA 1604
EPA 1600
MF-SM9222D
EPA 1603
EPA 1600

POTABLE WATER (MICROBIOLOGY) Effective Date 19 OCT 2022 Expiration Date 30 JUN 2023

Analytes

* HETEROTROPHIC PLATE COUNT	
* TOTAL COLIFORM	WATER TREATMENT AND DISTRIBUTION (P/A)
* TOTAL COLIFORM	WATER TREATMENT AND DISTRIBUTION (P/A)
* TOTAL COLIFORM	WATER TREATMENT AND DISTRIBUTION (P/A)
* FECAL COLIFORM	SOURCE WATER (ENUMERATION)
* E. COLI	WATER TREATMENT AND DISTRIBUTION (P/A)
* E. COLI	WATER TREATMENT AND DISTRIBUTION (P/A)
* E. COLI	WATER TREATMENT AND DISTRIBUTION (P/A)
* TOTAL COLIFORM	SOURCE WATER (ENUMERATION)
* E. COLI	SOURCE WATER (ENUMERATION)
* E. COLI	SOURCE WATER (ENUMERATION)
* ENTEROCOCCI	SOURCE WATER (P/A)
* ENTEROCOCCI	SOURCE WATER (P/A)

Methods

SM9215B
MF-SM9222B
EPA 1604
ENZ. SUB. SM9223
MF-SM9222D
ENZ. SUB. SM9223
EPA 1604
NA-MUG-SM9222G
EPA 1604
EPA 1603
EPA 1604
EPA 1600
ENTEROLERT

**COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION**

Certified Parameter List as of: 19 OCT 2022

**M-MA022 ANALYTICAL BALANCE, DIV OF THIELSH ENG
MIDDLEBOROUGH MA**

NON POTABLE WATER (CHEMISTRY)	Effective Date	01 JUL 2022	Expiration Date	30 JUN 2023
<u>Analytes</u>				<u>Methods</u>
ALUMINUM				EPA 200.8
ANTIMONY				EPA 200.8
ARSENIC				EPA 200.8
BERYLLIUM				EPA 200.8
CADMIUM				EPA 200.8
CHROMIUM				EPA 200.8
COBALT				EPA 200.8
COPPER				SM 3111B
COPPER				EPA 200.8
IRON				SM 3111B
LEAD				EPA 200.8
MANGANESE				SM 3111B
MANGANESE				EPA 200.8
MOLYBDENUM				EPA 200.8
NICKEL				EPA 200.8
SELENIUM				EPA 200.8
SILVER				SM 3111B
SILVER				EPA 200.8
THALLIUM				EPA 200.8
VANADIUM				EPA 200.8
ZINC				SM 3111B
ZINC				EPA 200.8
PH				SM 4500-H-B
SPECIFIC CONDUCTIVITY				SM 2510B
TOTAL DISSOLVED SOLIDS				SM 2540C
HARDNESS (CACO3), TOTAL				SM 2340B
HARDNESS (CACO3), TOTAL				SM 2340C
CALCIUM				SM 3111B
MAGNESIUM				SM 3111B
SODIUM				SM 3111B
POTASSIUM				SM 3111B
ALKALINITY, TOTAL				SM 2320B
ALKALINITY, TOTAL				EPA 310.2
CHLORIDE				SM 4500-CL-B
CHLORIDE				SM 4110B
SULFATE				SM 4110B
AMMONIA-N				EPA 350.1
NITRATE-N				SM 4110B
KJELDAHL-N				EPA 351.2
ORTHOPHOSPHATE				SM 4500-P-E
ORTHOPHOSPHATE				SM 4110B
PHOSPHORUS, TOTAL				SM 4500-P-B,E
CHEMICAL OXYGEN DEMAND				HACH METHOD 8000

**COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION**

Certified Parameter List as of: 19 OCT 2022

**M-MA022 ANALYTICAL BALANCE, DIV OF THIELSH ENG
MIDDLEBOROUGH MA**

NON POTABLE WATER (CHEMISTRY)	Effective Date	01 JUL 2022	Expiration Date	30 JUN 2023
--------------------------------------	-----------------------	--------------------	------------------------	--------------------

Analytes

BIOCHEMICAL OXYGEN DEMAND
NON-FILTERABLE RESIDUE
CHLORINE, TOTAL RESIDUAL
OIL AND GREASE

Methods

SM 5210B
SM 2540D
SM 4500-CL-G
EPA 1664

POTABLE WATER (CHEMISTRY)	Effective Date	19 OCT 2022	Expiration Date	30 JUN 2023
----------------------------------	-----------------------	--------------------	------------------------	--------------------

Analytes

* ANTIMONY
* ARSENIC
* BARIUM
* BERYLLIUM
* CADMIUM
* CHROMIUM
* COPPER
* COPPER
* LEAD
* MERCURY
* NICKEL
* SELENIUM
* THALLIUM
* NITRATE-N
* NITRATE-N
* NITRITE-N
* NITRITE-N
* FLUORIDE
* FLUORIDE
* SODIUM
* SULFATE
* TURBIDITY
* CHLORINE, RESIDUAL FREE
* CALCIUM
* CALCIUM
* ALKALINITY, TOTAL
* TOTAL DISSOLVED SOLIDS
* PH
* TRIHALOMETHANES
* VOLATILE ORGANIC COMPOUNDS

Methods

EPA 200.8
EPA 200.8
EPA 200.8
EPA 200.8
EPA 200.8
EPA 200.8
EPA 200.8
SM 3111B
EPA 200.8
EPA 200.8
EPA 200.8
EPA 200.8
SM 4110B
SM 4500-NO3-D
SM 4110B
SM 4500-NO2-B
SM 4110B
SM 4500-F-C
SM 3111B
SM 4110B
SM 2130B
SM 4500-CL-G
SM 3500-CA-B
SM 3111B
SM 2320B
SM 2540C
SM 4500-H-B
EPA 524.2
EPA 524.2

APPENDIX F

State Wage Rates